GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

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VOL. CLIX. No. 3092.] LONDON, AUGUST 16, 1922. [74TH YEAR. PRICE 1s.

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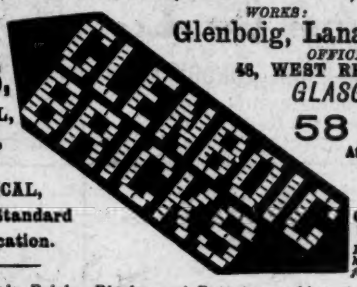

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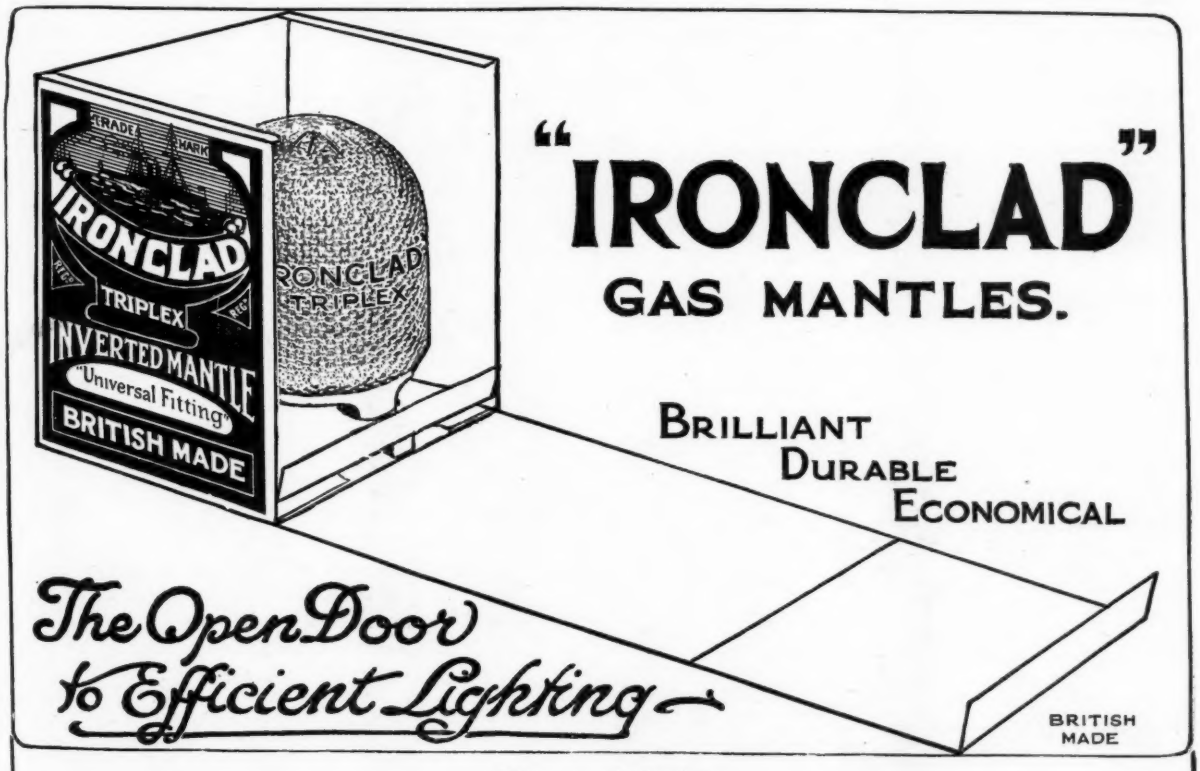

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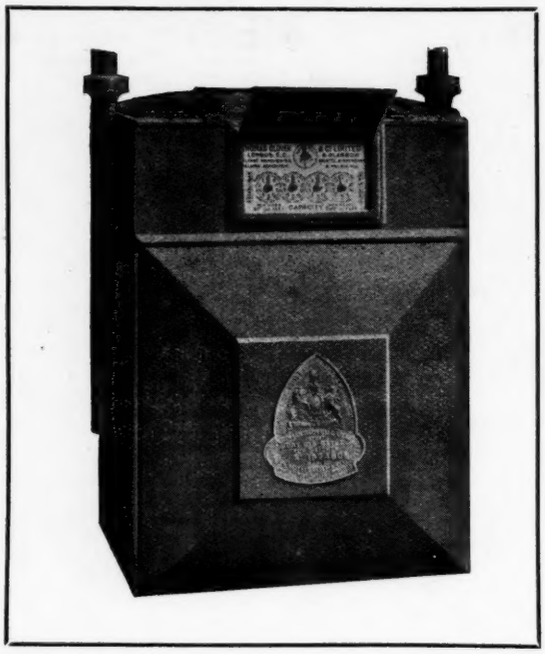

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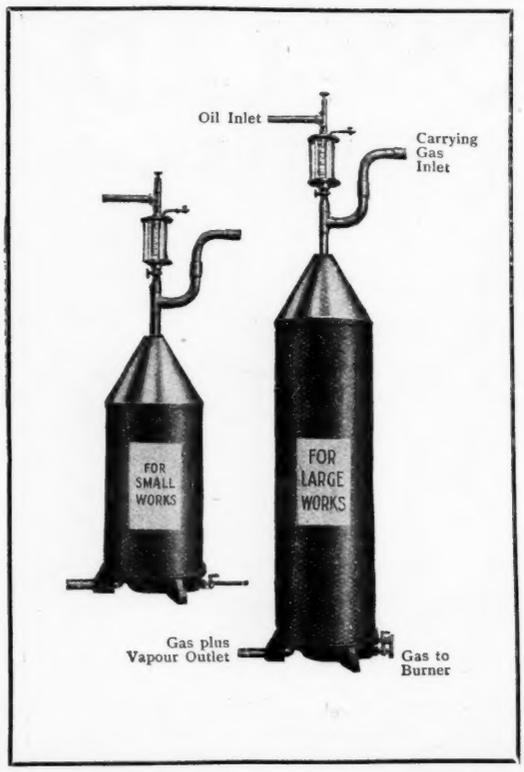

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VOL. CLIX., No. 3092.] WEDNESDAY, AUGUST 16, 1922. [74TH YEAR.

EDITORIAL NOTES.

A High-Pressure Gas Distribution Scheme for East Kent.

A SCHEME which is an innovation in British gas supply, and, if carried out, will be both a technical and commercial development, is proposed for a considerable area in East Kent; and we entertain the hope that it will materialize—not that we can predict for it success or non-success, though the promoters are confident, and they have at their backs as expert gas engineers Mr. Arthur Valon (who knows Kent well) and Mr. W. Doig Gibb, whose opinions are always the outcome of his personal convictions based on a considerable professional experience. What the scheme amounts to is this: There is a large area of the county of Kent sparsely populated, and which is destitute of gas. In parts of this, the promoters can see a field for a good aggregate business if gas can only be transmitted cheaply enough from a common source. If, too, gas can be conveyed from the source of production at a cheap rate, and can be supplied at tempting prices, they foresee patronage by existing authorized gas undertakings in purchasing gas in bulk; and for this power has been sought, in a Special Order under the Gas Regulation Act, to lay mains through areas in which the promoters will not be able to give a supply in detail. They likewise see that the availability of a supply of gas throughout an undeveloped area of the county will bring progressively new industrial life into it. The whole scheme has its base on coke-ovens being constructed at Kentish collieries; and high-pressure distribution through steel mains is the means for cheap transmission. The Chislet Colliery Company have decided to instal coke-oven plant, and to dispose of the surplus production of gas to the promoters of the scheme, who, by the way, are Messrs. Drew-Bear, Perks, & Co. Their intentions are to erect thirty coke-ovens to deal with 900 tons of coal per day, which would be equal to a production of some 10 million c.ft. of gas. It is expected that the coke-ovens will find in France a ready market for the metallurgical coke. The capital that has been sought is £120,000 with £60,000 loan, or £180,000 in all. But at the outset about one-third of the total will suffice for the first section of the scheme.

We should like for various reasons to see the scheme carried through. High-pressure gas distribution is not a thing that is unknown in this country. High pressures are used for boosting purposes, and for transmitting gas from existing gas-works to outside areas. But this scheme has something entirely new in its objects. It has been the dream of many men to carbonize coal at the pithead, and to send the gas through high-pressure mains into distant areas for domestic and industrial use. There are several instances, of course, of the purchase of gas by the owners of gas undertakings from coke-oven plants situated at collieries; but this is the first example of the promotion of a scheme for the distribution of such gas and trading in it in bulk and detail by a concern specially constituted for the purpose. This being so, the experience that such a scheme would afford would be valuable, though even its success would not be any surety that a similar project would be equally successful elsewhere. Areas would vary in appropriateness; but this one appears to be very suitable for the new venture. It is noticeable in the evidence of Mr. Doig Gibb and Mr. Valon, at the Board of Trade inquiry, that both of them spoke somewhat guardedly regarding this point. Mr. Valon referred to the scheme as being a really good commercial proposition for this particular area, which does not bind him to any suggestion that a similar scheme would be good in all circumstances. Mr. Doig Gibb also declared that the area in question was very suitable for high-pressure distribution; and, commercially speaking, it would be impossible to give a supply in any other way. However, the scheme is, in effect, in accord with the work that is being done in promoting fuel economy; and it is certainly in sympathy with the views held by the Fuel Research Board when they proposed the components that were assembled in, and given effect to by, the Gas Regulation Act. That measure invites amalgamations, extension schemes, and other developments that will lead to economy in coal and gas supply. The proposals should also be an advantage to the Kent collieries themselves. They have not had a very prosperous history. But to-day everything points to the turning of the tide; and in giving profitable utilization to gas from coke-ovens (much of the coal seems peculiarly applicable to the production of foundry coke), this will be an aid to further improvement in the position of the collieries.

The question arises as to the purchase of the gas in bulk by gas undertakings. This is a somewhat speculative business. The whole matter hinges on whether the gas can be offered to them at an economic price. But Kent being so far from the Northern and Midland coal-fields, coke-oven gas from the Kent collieries ought to have little difficulty in competing in price. But, of course, this general statement does not cover the whole ground. The price of coke-oven gas that would be favourable for one undertaking might not be so for another, in view of the differences between the undertakings in their net costs of production and in their markets for secondary products. There are many factors which come into the question, and which must determine the price that can be paid for the gas; and these factors include the capital and maintenance costs of plant that has to be provided as a stand-by to meet any untoward emergency. Anyway the scheme is a constructive one; and we wish it well in developing evidence that such a project can carry at a reasonable price the conveniences of gas to benighted rural areas that have never had the privilege of intimately knowing them. Certain it is that high-pressure distribution is a plan for the service of such areas preferable to a number of small isolated gas plants, which are relatively expensive to run.

The explanatory information as to the scheme is given in our news columns to-day; but in an earlier article particulars are supplied as to improvements in high-pressure governors, an automatic booster compressor, and a new service connector which has been designed to facilitate the making of attachments to steel mains, and to prevent waste of gas leakage. These developments are the work of Mr. E. A. Mitchell, who has been specially studying in detail the question of high-pressure distribution in America. He is the Consulting Engineer and a Director of the firm promoting the East Kent Order; and his governor, automatic booster compressor, and service attachment arrangement, it is proposed to utilize in the scheme. We will not here go into the details of these developments. They will be found elsewhere, together with illustrations. Enough, however, has been said to show that there is, for the technical and commercial men of the industry, interest in these plans; and it is hoped this interest will have opportunity to expand.

The Rich Gas Fallacy.

THE newspaper crusade against the increase of gas bills for last quarter, in comparison with the corresponding sultry quarter of 1921, has continued; but, on the whole, there has been a partial abatement. The "Daily Mail" and the "Pall Mall Gazette" have been chiefly instrumental in keeping the subject alive. The first-named paper has done so in articles which are grotesque by their distortion of facts, though what is said is no doubt accepted by the public whose knowledge of the subject is as ill-informed as is that of the "Daily Mail." In its issue for Tuesday of last week, our morning contemporary remarked: "It may be quite "true that certain companies, of which special complaint "is made, are supplying a much richer gas than under the "old system. But the householder's complaint is that it "cannot be burned economically in his existing appliances, "whereas the old gas could." Further on, we read: "The "rich gas is, in fact, as useless in the cooking-stove as a too "rich mixture in a motor-car engine, which costs more, and "takes the car a shorter distance, than the economical "mixture." There is a large amount of absurdity underlying these statements. A "much richer gas" is not being supplied than under the old system. For the greater part of last quarter, the Gas Light and Coke Company were sending out gas on a declared calorific value of 475 B.Th.U. per cubic foot; the actual value supplied (according to the tests made independently of the Company) was 482 B.Th.U. Now they are supplying on a declared calorific value of 500 B.Th.U. The difference is but a fraction more than 5 p.ct. One cannot call that a "much" richer gas. The difference indeed is so small as to be almost negligible in actual use. The same with the South Metropolitan Company's gas. The increase in the declared value is only from 550 to 560 B.Th.U., or less than 2 p.ct. Then what is meant by the gas being richer than "under the old system?" The "old system," we take it, refers to pre-war times. In the year 1913, the official tests show that the Gas Light and Coke Company were supplying gas of 538 B.Th.U. Gas of 482 B.Th.U., or of a little over 500 B.Th.U. as now supplied, is not "much richer" than the pre-war gas of 538 B.Th.U. The "Daily Mail" is absolutely at sea. Then it is alleged that the gas cannot be burned as economically in the consumer's appliances as the "old gas" could. This is interesting, because the appliances in pre-war days were capable of burning, and did burn, gas of a higher calorific value than that generally supplied now. Nevertheless, our contemporary alleges that the present "rich" gas is as useless in the cooking-stove as a too rich mixture in a motor-car engine. It is all highly amusing. In the circumstances, there is nothing to be gained by talking to the "Daily Mail" of the efficiency of gas in use being almost identical over a very considerable range of calorific values, given the adjustment of the gas and air regulators, which is such a simple matter. One point that has been made public during the newspaper storm has been by Mr. Cyril H. M. Jacobs, the Vice-Chairman of the Public Control Committee of the London County Council, who points out that it is more expensive, under the therm system, to waste gas of a high calorific value than to waste the same volume of gas of a lower calorific value. It is an obvious point, but one often overlooked.

High-Temperature Carbonizing and a Free-Burning Smokeless Fuel.

IN last week's issue, publication was given to the paper by Messrs. E. R. Sutcliffe and Edgar C. Evans, in which was described their process for carbonizing by internal heating—using briquettes manufactured, without a binder, from different mixtures of coal, including in the aggregate non-caking coal or gas coke. There need be no reiteration of the points made in our comments last week; but we see that, in the discussion on the paper, there were some critics. The great possibilities of the process as indicated by the authors were acknowledged by most of the speakers. The submission that the combustibility of coke is due to its structure rather than to volatile content is in our opinion pre-eminently the interesting feature. In the discussion, Dr. Illingworth declared this confirmed his own experiments; and he claimed that he could make any type of fuel up to a zero volatile which would burn freely. But here we get the experts at variance. Messrs. Sutcliffe and Evans claim that what they have achieved is due to two things—briquetting mixtures of coal and internal heating. Dr. Illingworth challenges any benefit from the briquetting, but submits that the combustibility of the fuel has to do with the temperature gradient. It will be remembered that the authors made the point that they secured at the beginning of carbonization low-temperature products, in view of the uniform and gradual rise to high temperatures to which the charge is subjected by internal heating. The point as to whether briquetting has or has not any valuable effect upon the coke structure is one which must be fought out by the experimentists. But it appears obvious that, without briquetting, the varieties of coal which Messrs. Sutcliffe and Evans employ could not be used, and still produce a coke of uniform structure. What they effect could not be realized by a less intimate and systematic admixture of the coals—that is to say, by the mixture of coals in the rough. In the making of the briquettes, the different coals are ground and mixed together; and so it seems to us that, in the matter of fuel selection, they have a larger scope than Dr. Illingworth could possess by non-briquetting. However, he is convinced that a coke of the required hardness and combustibility can be secured without the preliminary briquetting. If this is so, then the balance of advantage must be determined as between the elimination of the briquetting costs and the ability to choose and purchase for carbonization purposes from a large range of coals. If the briquetting expenses could be ruled out, this would bring down the costs of the process per ton to a very low figure indeed, if there can be reliance on estimates based upon experimental working. But we have a certain amount of doubt as to whether the same uniformity of coke product could be realized without the briquetting, as each coal must be treated on its merits, and the merits of each coal must determine the proportions constituting a mixture and therefore the briquette. There seemed to be in the discussion some amount of suspicion regarding the cost estimates—the authors doing so much work for such a moderate expenditure. The question was also raised as to whether there would not be a certain amount of sticking of the briquettes in vertical retorts; but Mr. Evans says there has been no sticking in the small experimental retort employed. When in India, he used a retort with an output of 10 tons a day. There was not the slightest difficulty with sticking; and he does not anticipate there will be any in this respect when operating on a commercial scale.

The Storage of Coal.

INTERMITTENTLY the subject of the storage of coal in relation to the questions of spontaneous combustion and preservation comes to the surface. Just lately it has again had some publicity. It is a good thing nowadays that attention should be fairly frequently turned to the matter, because coal costs more money, and the value of coal stored in quantities for public utility undertakings and industrial service is greater per unit than formerly. Moreover, the lessons of the recent past in regard to labour have emphasized the importance for protective purposes of good reserves of coal. Insurance costs also go up in proportion to the quantity and the value of the coal. But if a system of storage could be devised which would in itself be a guarantee of safety, then insurance would become a matter of secondary consideration.

Many factors contribute in greater or less degree to the spontaneous combustion or deterioration of coal; and there is no doubt that, taking all the factors into account, the most effective system of protection is to submerge the coal in water. But this means the heavy capital cost of constructing tanks for the purpose, the outlay in maintenance, and the additional cost of removing the coal when occasion requires it. Though the most effective means of protection, on balance it is a question, which most men have determined by their practice, whether it is worth while to engage in the hydro-method, in view of the moderate additional gain in efficiency in safeguarding. In last week's issue of the "JOURNAL" [p. 326], a description was given of some coal-storage "basins" constructed at Denver (U.S.A.) for storing coal reserves under water; each basin holding from 8000 to 12,000 tons of coal. Judging by the structural details, these stores must have cost a considerable sum of money. In this week's issue there are two more contributions to the subject. One is a translation of the main parts of a paper on the preservation of coals that M. Forrières read before the Société Technique de l'Industrie du Gaz. It is

true this paper is founded entirely on laboratory experiments; but they were carried out on the same coal—one sample being used for determining analytically the characteristics of the coal, and the other three the effect on the coal of free air circulation, restricted air circulation, and storage under water. The results show conclusively that storage under water is protective, and prevents the wasting, of the volatile matter in the coal; and it is certain that it would obviate spontaneous combustion. But, as pointed out, this is too expensive for ordinary storage purposes. To allow free air circulation is to court trouble. Therefore, restricted circulation is the next best method. M. Forrières suggests storage within solid walls, or, if these are not available, improvised walls of stone or retort fragments filled-in with coke and coke dust, and the covering of the coal with fine screenings. This latter provides the cheapest and readiest means of preservative storage.

The second contribution this week is a report, presented to the United States Bureau of Mines, on the factors contributing to the spontaneous combustion of coal. The document points out the conditions which facilitate the action. There may not, however, be complete accord with all that is said in this connection. The smaller the coal, the larger area of the surface for a given weight, and so the greater the chance of spontaneous combustion. And later on it is recognized that the taking-up of oxygen produces heat; and then the question presents itself of reducing and getting rid of the latter. A coal pile, it is stated, is cooled by radiation, and by the movement of air through it. "Air "moves rather freely through a pile of coal; and in many "piles of coal, this natural change, or breathing of air, is "enough to carry away the heat generated." But this appears to be a direct negation of the theory, which has been proved experimentally, that the more air that is allowed to pass through stored coal, the greater the absorption of oxygen, and therefore the greater the heating. It is opposed to common sense to apply, for "cooling" purposes, any means that will contribute to the raising of the temperature of the coal; and the supply of oxygen in the air is an active means to that end.

However, there are other parts of the American report that contain quite good hints regarding the storage of coal. There is one as to the importance of temperature. Coal that is stored at a time of year when the temperature is high will generate more heat than if stored at a period of the year when the temperature is low. Thus coal stored at the height of summer (if hot conditions prevail) is much more liable to heat-up than if stored during winter. Then, again, fresh coal is more prone to give trouble than more matured coal, owing to the avidity of the fresh surfaces for oxygen. Spontaneous combustion rarely occurs after the coal is some two or three months old. This fact should be borne in mind by those who are in the habit of crushing coal immediately before it is stored. These are two points worth remembering by those responsible for the safety of coal stocks.

Sulphate of Ammonia Prices.

There is a little improvement in the price of sulphate of ammonia for September and October delivery. The British Sulphate of Ammonia Federation, Ltd., have issued their usual circular. This puts the price at £16 8s. per ton for neutral quality in fine friable condition, free from lumps, on the basis of 25¾ p.ct. ammonia. The July-August price was £16 3s. But earlier in the year £17 was being obtained for 25¾ p.ct. quality.

The Therm and the Dividend.

The "Ironmonger," referring to the tirade in the daily Press against the gas industry, points out that the ill-informed (though well-intentioned) writers are all missing the point completely when they blame the gas industry for the present position. The intention of the Gas Regulation Act was to increase the standard or maximum price of gas so as to correspond with the increased costs of production, and thus give to the shareholders a reasonable dividend. No one can dispute that the capital employed in the work of gas production, distribution, and general service should be properly compensated. Says our contemporary: "The fundamental fact is that it was always the intention of the gas undertakings to get a higher price, in order to recoup themselves for the increased cost of production, as has been done in every other industry. They certainly did not proclaim this from the housetops. But it was an obvious business policy; and if it hits the consumer, he must blame Parliament (which is supposed to watch over his interests) or rather himself, who elects Parliament."

Pumping Hot Liquids.

A useful article on this subject is contributed to our columns this week by Mr. William Mason, who is a chemical engineer. He treats of the difficulties that are met with in the pumping of hot liquids from different depths. There is a limit to the depth from which a pump will draw water of a given temperature; the limit decreasing as the temperature increases. Moreover, above a certain temperature, it becomes necessary to supply the water to the pump under pressure. But it is not every engineer who is of the mathematical turn of mind to calculate the provision to be made under a given set of conditions. The article describes the difficulties and the methods of circumventing them. Explanation is first made as to the conditions usually met with; and from this starting-point, the article leads the reader on to the new factors which enter into the calculation, and the extra allowances that have to be made. In the presence of hot water, for instance, a factor called the "pressure of water vapour" demands consideration. What is meant by this, and how pump suction is affected by it, are explained. The effect of atmospheric pressure at the various elevations above sea-level at which pumps may have to work is described, as well as the conditions that obtain when the water is so hot that it has to be supplied under pressure. The value of the article is enhanced by elucidating calculations as to how to meet the difficulty-creating changes in condition; and these are accompanied by a series of helpful tables. There is often a disposition to blame a pump for inefficient duty, when the changes in conditions under which the pump is expected to work are actually blameable.

Lightning and Electric Wires.

Lightning and electric wires are not the most congenial companions. Last week supplied additional evidence of this. At Folkestone, on Wednesday night of last week, there was a particularly heavy storm. The lightning was very vivid, and there were tremendous crashes of thunder. Several buildings, reports say, were damaged, and "many electric lights were fused." The Parish Church was a victim; and the Vicar states that "all the electric lights were fused." The switch-board in the vestry was also put out of action, and the switch-boxes were hurled from one side of the vestry to the other. During a violent storm at Lyons the other day (so it is reported), a "thunderbolt" fell on the station which supplies the city with electricity for lighting and industrial power. The large building took fire; and damage to the extent of £60,000 is alleged. These happenings to electrical equipment due to elemental disturbances will not assist in reinforcing belief in the safety of electricity.

The American Coal Strike.

Just as our coal markets were experiencing more buoyancy through the protracted coal strike in America, through the fairly considerable demand for gas and steam coals, with our miners glad enough to get more employment and money by doing their part in the coal-feeding of America, there comes the news from Cleveland that conferences have been taking place between the operators and the coal-miners' union leaders which have virtually ended in a decision to concede a settlement of the bituminous coal strike in Ohio, Pennsylvania, Indiana, and Illinois. No definite result has yet been announced; but there is hope in the air.

Gas Coal Position.

It is learned that in Durham and Northumberland the position regarding gas coal is very firm, owing to the heavy bookings supplementing the home demand. The quotations for the best classes hover round about 25s. per ton; but for secondaries, 23s. to 24s. is about the price asked, but not always obtained under new contract conditions. In other coal areas there has been a hardening of prices in view of the expectation of further demand for gas coal for use in America.

The Folly of the Engineering Unions.

The Social Democratic Federation have recently held a conference, and have discussed many subjects relating to our social

conditions. Among other matters under consideration was the engineers' lock-out, and its lessons. Some very sensible points were made by Mr. W. H. Hutchinson, of the Amalgamated Engineering Union. Had this representative possessed the full power and responsibility of a leader, there would have been no lock-out on the question of managerial functions. In his opinion, unless the trade can meet a six months' strike, there is little hope for the men succeeding in such a dispute. What were the conditions in this instance? When the issue of managerial functions was introduced, the Union had 95,000 unemployed, and during 1921 they disbursed £2,100,000 in unemployed benefit, and had spent an immense sum on sick and superannuation benefit. The outstanding lesson of the struggle, he thinks, is that the present method of workers' organization in the engineering industry is entirely unsatisfactory. It is quite hopeless for fifty different unions to attempt to negotiate with one employers' association. Some method, he urges, must be found of bringing together all the workers in the industry. The value of one big union as a practical organization is, however, doubted by Mr. T. Kennedy, M.P. Of course, in this case the leaders cannot be altogether blamed for the lock-out. The results of the ballot of the men themselves on the provisionally agreed terms were the instructions to the leaders. Where they failed in diplomacy was in not informing the members of the financial condition of the Unions through the adverse circumstances of the times, as well as the economic condition of the engineering industry itself. The extent of unemployment would have been a sufficient warrant for proffering strong advice to the men to accept the agreement.

Volume Loss by Light Oil Removal.

Messrs. Frank Henry and Norman F. Prince, of the Rochester (N.Y.) Gas and Electric Corporation, have been carrying out an investigation of the costs involved in recovering light oils from coal gas. In this plant, the Koppers method of recovery is employed, the gas being passed through a steel scrubbing tower in contact with a shower of wash oil which removes most of the benzole, toluol, solvent naphtha, &c., from the gas. After distilling off the light oils, the wash oil is cooled and re-circulated through the scrubbing tower. They point out that the test would have been a comparatively easy one to carry out, if nothing except light oils were removed by this process, and if these were taken out continuously and completely. As a matter of fact, however, scrubbing also removes some of the diluent constituents of the gas. Also, since in actual plant operation the complete removal of light oils is not attained, it was necessary to determine the efficiency of removal on the days when the tests were made. The experimental procedure is explained in detail by the authors, who go on to state that in three tests the volume loss due to light oil removal varied between 0·64 p.ct. and 2·14 p.ct. This, they remark, is doubtless due to varying conditions of the scrubbing oil, temperature, and nature and amount of oil in the unscrubbed gas. It should be noted in this connection that figures given as cubic feet of light oil in the gaseous state are not necessarily proportional to the figures expressing its volume as a condensed liquid in cubic centimetres. This is proved by the author's tabulation of data and computations, and is due to the difference in composition of the light oil extract on different days. Thus, though the yield of light oil on two days may be exactly the same, the volume loss on these two days may be widely different.

The Effect of Lighting on Output.—M. Luckiesh of the Nela Research Laboratories has been investigating the effects of higher intensities of illumination on the speed of reading, and has found a definite increase of "speed of vision" as the illumination intensities increased. For ordinary reading matter (black print on white paper) the speed of reading increased 15 p.ct. when the illumination increased from 4 to 16 foot-candles. For black print on grey paper, the increase in speed was 50 p.ct. when the illumination intensity increased from 4 to 16 foot-candles.

Desulphurizing Coke.—There has recently been begun at the Pittsburgh Experimental Station of the United States Bureau of Mines a study of the desulphurization of coke, reference to which has already been made in the "Journal." This, it is pointed out, is a practical follow-up of the theoretical study of the oxidation of iron sulphate in the coke, and the subsequent removal of the free sulphur formed by this oxidation. Literature on the subject is being reviewed. Many patents were taken out in the period from 1850 to 1870, but few have been applied for since. Roasting and steaming were favourite suggestions. In this connection, methods for converting sulphur in coke into the FeS form are being sought. It is argued that a process based on such a method would hold-back sulphur that might ordinarily be evolved, and then this sulphur could later be removed by oxidation, together with much additional sulphur. The work is being undertaken by Dr. A. R. Powell (Physical Organic Chemist) and Mr. John H. Thompson (Research Fellow of the Carnegie Institute of Technology).

PERSONAL.

Last Monday's contribution to a weekly series of special articles in the "Financier" on "Men of Mark in Business" was devoted to a short biography of Dr. Charles Carpenter, C.B.E., the President of the South Metropolitan Gas Company. Entering the service of the Company as a young man fresh from what is now the Birkbeck College, and full of enthusiasm for the application to technology of physical and chemical science, Dr. Carpenter, it is pointed out, early attracted the attention of the late Mr. James Shand (whose name will be remembered in connection with the development of the steam fire-engine), the then Chairman of the Company, and afterwards of his successor, the late Sir George Livesey, by whom he was given an important post in the technical conduct of the undertaking at an age which caused surprise to most of his contemporaries. The writer goes on, however, to say that the choice was justified, and when, upon the death of Mr. Frank Livesey, the position of Chief Engineer became vacant, Sir George recommended the junior member of the engineering staff, Dr. Carpenter, for the position. It is a matter of interest to record the fact that he was "sounded" in respect of his acceptance of a similar post with the two Companies next in size to that with which he was then associated—namely, the Gas Light and Coke Company and the Liverpool United Gas Company. The professional work which brought him most into prominence was the development of the Siemens method of firing in its application to the heating of gas-retorts. On the death of Sir George Livesey, Dr. Carpenter was elected to fill the two vacancies arising on the Boards of the South Metropolitan and South Suburban Gas Companies, becoming immediately afterwards the head of the former undertaking. He is also Deputy-Chairman of the European Gas Company. For his war services, he was made a C.B.E. With the collaboration of Dr. Rée, of Manchester, and Dr. Alexander Scott, of London, Dr. Carpenter was instrumental in laying-down the lines of, and forming, the Association of British Chemical Manufacturers, which today includes practically all the chemical manufacturers of Great Britain. It is, however, no doubt, as the writer of the article remarks, primarily in regard to the development of the South Metropolitan Gas Company that Dr. Carpenter would desire to be judged, and with his great work in this connection readers of the "Journal" are familiar.

Mr. Robert Gray, of Kirkintilloch, has been appointed Assistant Manager at the Hamilton Gas-Works.

Mr. O. P. Hood, Chief Mechanical Engineer of the United States Bureau of Mines, sailed last month for London. He will spend three months in Europe investigating new developments in lignite utilization and the low-temperature carbonization of coal, for the purpose of applying the information to studies in lignite and fuel now being conducted under his direction in the United States by the Bureau of Mines. Mr. Hood will visit England, Germany, Switzerland, Belgium, Holland, Jugo-Slavia, Czecho-Slovakia, Austria, Italy, and France.

After 47 years' service with the Malton Gas Company—for 45 years as Manager and Secretary, and during the last two years as Secretary—Mr. Henry Tobey has retired. The Directors have appointed as his successor Mr. Thomas Law, who has now been with the Company for three years, the last two years as Manager. Mr. Law served his apprenticeship under Mr. Bissell at the Sowerby Bridge Gas-Works, and during the time he was there he obtained first-class honours in gas engineering, and certificates in the advanced stage of practical mathematics, chemistry, and kindred subjects, at the Halifax Technical College.

On Friday, Aug. 11, Mr. G. L. Swallow, the Manager of the Elswick Gas-Works, attained his jubilee of service with the Newcastle and Gateshead Gas Company. He was appointed a foreman at the Elswick works in 1872, and has served under two Managers (Mr. H. M'Pherson and Mr. G. Ridley) and three Chief Engineers (Mr. W. Doig Gibb, Mr. T. Hardie, and Mr. F. P. Tarratt), and also five Chairmen of Directors and three Secretaries. He is the oldest official of the Company. When Mr. Swallow took up service with them, the whole of Newcastle and Gateshead was supplied with gas from the Elswick works, and the output of a week was short of the quantity used at the present time in a single day. Mr. and Mrs. Swallow celebrated their Golden Wedding last October, but Mrs. Swallow died a few months later.

OBITUARY.

The death is announced, at the age of 51, of Mr. John Canning the Manager of the Balbriggan (co. Dublin) Gas-Works.

The death has occurred in Birmingham of Dr. Gisbert Kapp, formerly Professor of Electrical Engineering in the University of that city. He received his training as an engineer at Zurich, and came to England in about 1874. From 1881 he devoted himself to the electrical side of his profession, and in 1894 went to Berlin as General Secretary of the then newly-founded German Association of Electrical Engineers, Editor of the "Electrotechnische Zeitschrift," and lecturer in the Charlottenburg Technical University. It was in 1904 that Dr. Kapp was offered the Chair of Electrical Engineering at Birmingham. He had been President of the Institution of Electrical Engineers and of the Engineering Section of the British Association.

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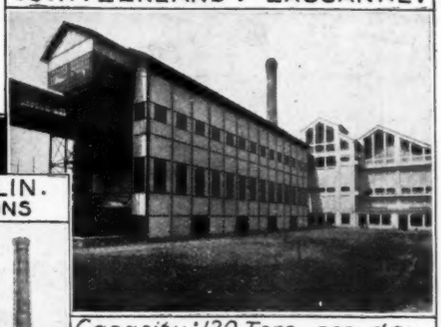

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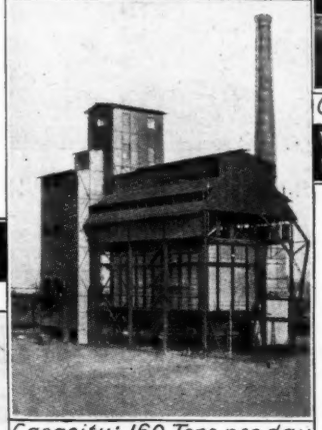

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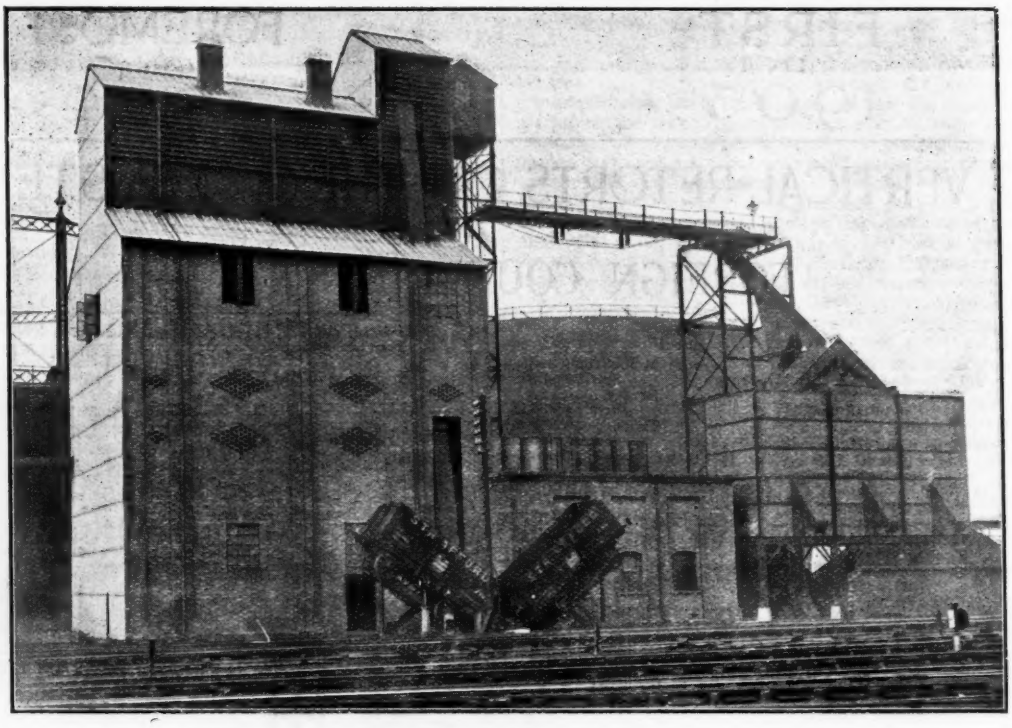

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ELECTRICITY SUPPLY MEMORANDA.

THERE has been little jubilation in the electricity supply industry over the installation of the Electricity Supply Act in the Statute Book—the reason for this being the diversity of view that exists in regard to the reorganization of electricity generation under joint authorities. Some want it; many do not. "Meteor" of the "Electrical Times" has done his best to cheer-up those with whom the Act finds favour, but who have been a little disheartened by the fencing that has been constructed about the original proposals. And those who are pessimistic, he has endeavoured to turn into optimists. He lightheartedly writes: "The electrical ship has managed to reach port. . . . It is a leisurely sequel to the Act of 1919, and is none the worse for being the child of compromise." That is open to question. However, there can now be operation under this auxiliary piece of legislation. The troubles involved in securing it are over; and now the real difficulties of the joint authorities will begin in respect of the matter of financing. Is it likely that money will flow in freely for the purpose of putting-down large generating stations? It is a bit doubtful. Some money may be obtained from the local authorities who will be taking a supply from the joint authorities' plant; but, generally speaking, we should imagine that in this direction there will be a disinclination on the part of local authorities to subscribe money (for which the local rates are to be pledged) for expenditure by an authority over the proceedings of which they have only partial control. The spade work of the Electricity Commissioners, "Meteor" praises. "They have," so he picturesquely puts it, "cleared the site for reconstruction; and before long each district should be fitted with an organization adapted to its needs." He thinks the coming autumn and winter should produce a shoal of invitations to tender for plant and mains. The manufacturers will be pleased if the prediction matures. As to the consumers of electricity, he is gratified at there being no longer any obligation to offer them a flat rate per unit. Other tariffs may now be legally adopted.

What of the Morrow?

The Engineer and the Commercial Man.

One result of the Act will be a gradual changing of the position of the electrical engineer. The engineer of to-day has generating and distribution plant under his charge, as well as the general management of the business. The Act holds out the prospect of a decided change. Many undertakings will commence to take energy from the joint electricity authority to meet new business; and as the local plant becomes obsolete or worn out, the more will electrical energy be drawn from the central suppliers. So the work of generation for many undertakings will become centralized under one chief engineer; while the local engineer will be progressively deprived of his producing work, and will have his abilities confined to distribution and trading. Some engineers, however, are poor administrators, and are not commercial geniuses. The field in which to exercise knowledge and ability will become restricted; and with the transfer of generation from the care of the local engineer, some parsimonious local authorities will find cause for salary reductions, or the appointment of men specially qualified for distribution and sales work. There will certainly be a lessening of the number of more valuable posts in the industry. "Meteor" comments on this phase of the matter as though it were a great gain; the engineers chiefly concerned may not think the same.

Confusion Predicted.

After reading "Meteor's" pleasant references to the new Act, it will not do for those who are converted by him to read "Gossip" in "Electrical Industries." If they do, there may be a revulsion of feeling. The writer of those notes has an emphatic way with him; and his opinions are expected to be taken as the last word on the subject. Our contemporary repeats its original conviction that, except in minor matters, the measure will do little good to anybody. "Its main purpose—that of conferring financial powers upon joint electricity authorities—represents an impracticable method of developing electricity supply, and, if any attempt is made to carry it out, the result will be delay and confusion interminable." That is not a bright outlook. In other words, the Ministry of Transport, the Electricity Commissioners, Parliament, and everybody who has had a hand in developing the measure are all wrong; and what they regarded as a piece of constructive work is merely an instrument for creating trouble. There is more of it. The merits of the measure are said to be chiefly negative; and it is pointed out as a curious fact that all through the debates in the House and before the Standing Committee, there was no real enthusiasm for anything the Bill contained. That is about true. Yet this is one of the issues of those reconstruction plans that were going to make a new heaven upon earth, but which all either have failed or have cost the country a fabulous amount of unprofitable money. Will history repeat itself? Will the schemes produce a cheap and abundant supply of electricity? One satisfaction the electricity industry can derive from the delay there has been in passing the supplementary measure to the 1919 Act. It is that the work that is to be undertaken will benefit from the reductions in the prices of labour and materials that have occurred during the past three years.

The Absolute Commissioners.

The Court of Appeal have established the authority of the Electricity Commissioners to veto the plans of the electricity undertakers if they do not accord with their own views. In this they are omnipotent; and the municipal electricity suppliers are not pleased to learn this is the legal reading of the law as instituted by the Electricity (Supply) Act of 1919. They feel now there should be power of appeal from the decisions of the Commissioners to some other tribunal. The Ealing Corporation, it will be remembered, challenged the authority of the Commissioners in respect of the sanction they refused to an agreement entered into with the Hammersmith Borough Council for a supply of electricity in bulk—the Commissioners apparently preferring that the accommodation of Ealing in this respect should come from the North Metropolitan Electricity Supply Company. It will be remembered that the Ealing Corporation applied for and obtained a writ of mandamus directing the Commissioners to show cause why they should not hear and determine their application according to law. But now the Court of Appeal have discharged the rule; the view of the Court being that the Commissioners had not acted in excess of the powers conferred upon them by the 1919 Act. In the course of his judgment, Lord Justice Bankes said it was obvious that in the proper exercise by the Commissioners of their jurisdiction, existing supply authorities might have to submit to what was an immediate disadvantage in a matter which the Commissioners believed to be to the ultimate advantage of the larger scheme they had in view. It had been contended that, during the transitory period, mutual assistance of the kind contemplated by Ealing might be necessary; that it rested with the local authorities to arrange the terms of any agreement for supply, and that when once it had been established that mutual assistance was required, the only jurisdiction of the Commissioners was to consider whether the terms of the agreement were reasonable. But the Commissioners submitted that Parliament intended them to have a much wider authority; that they had the right to formulate their policy as to the consolidation of areas; and although mutual assistance might be necessary, such assistance could only be given, subject to their approval. Their right to refuse the assistance proposed must be allowed if the policy suggested cut across the line of policy they themselves proposed to adopt. The Court agreed with this submission, and so, as that is the law, electricity undertakers will have to abide by it, no matter how autocratic they may deem the powers and decisions of the Commissioners.

Mr. Wordingham on Gas and Electricity.

Among the papers at the conference of the Sanitary Institute at Bournemouth was one by Mr. C. H. Wordingham, in which, judging by the report before us, he said many things about gas and electricity, and left unsaid many things which he might have included in the paper. But the latter did not suit his purpose. He had to bolster-up electricity, notwithstanding all the difficulties by which it is obsessed in respect of general use; and he fell into that old electrical error of doing so by traducing the gas competitor. We had always been of opinion that Mr. Wordingham was much above making use of the hoary arguments which constitute the trading stock of some electrical salesmen; but it seems we have been mistaken. He states a truism in the opening part of the paper when he says that the essential factors contributing to a much wider use of electricity are diminished cost of the appliances themselves, and their increased reliability, together with the lowered cost of the energy required to work them. Of course, these are all essential factors to progress. But the time and effort that have been spent in trying to secure these essentials have been enormous. However, he looks to standardization to realize a diminution in cost. Active measures are being taken to consolidate the generation of electrical energy, and so to cheapen its production. A few years should witness a great improvement in this direction. This indicates that Mr. Wordingham does not hope for some time to come to see any material advantage from this concentrating work. Of course, we read that electric light is well established as the ideal illuminant; and then: "Safety from fire is such that the fire insurance companies regard a house lighted by a poorly constructed electrical installation as far safer than one using any illuminant which involves combustion. Notwithstanding all the special pleading to the contrary, an illuminant which does not consume oxygen or give off unbreathable or actively poisonous gases must be preferable to any other which involves combustion. The mere fact that such ludicrous arguments as the burning-up of disease germs in a gas-flame are advanced to bolster-up the last lingering claims of gas lighting, are sufficient to show how bad is the case for it." A little later on in the paper, there is the statement that—"However high the price per unit of electrical energy may be, the cost of electric lighting is much less than nothing, if it be compared with that of gas or oil. The chief item in the cost of gas lighting is not the price per therm, or the price of mantles; but the cost of redecorating the rooms sullied by the dirt it makes, to say nothing of the valuable property in the shape of pictures, book bindings, silk and other hangings, which it destroys. This same dirt is most insanitary; and its presence tends to affect the lungs and to block the pores of the skin, while its depressing effect on the spirits is most noticeable when contrasted with the cheerful aspect of the fresh and bright decorations of an electrically lighted house." Continuing the perusal of the paper, it is

also observed that electric radiators require no flue; they heat-up instantaneously; they can be placed exactly where most comfortable for those requiring warmth. And as to electric cooking, well this is one of the most striking instances of the advantages of electric heating, because practically the whole of the heat developed is used for heating the joint, so there is hardly any waste by the escape of hot gases such as takes place in the gas-oven. But what about the hotplate, on which some 80 p.ct. of the heating work is done?

Some Comments.

This is all interesting coming from Mr. Wordingham; but it is very commonplace in the history of electrical propaganda. Regarding the safety of electricity, the fire insurance companies deem it necessary to have rules for installation which have to be complied with. This indicates danger. There are no similar rules applying to the application of gas. Then as to the words: "An illuminant which does not consume oxygen, or give off unbreathable or actively poisonous gas," &c. What does Mr. Wordingham mean by this? He gives no chemical authority for the statements. One would imagine it was a crime for a burner to consume oxygen. What is the oxygen there for, but for the service of man? The oxygen of the air of a room is being constantly renewed; if it were not, the atmosphere would become stagnant and noxious through the exhalations of the people occupying the room. This is one of the dangers of the use of electricity for lighting and heating, unless a fan is introduced, which auxiliary (to say nothing of the electric heating) a large majority of people cannot afford, and so do not adopt. We have come across cases, too, where fans created such draughts that their use has been discontinued. As to the consumption of oxygen, not even Mr. Wordingham suggests the continuous use of electric radiators for heating; and most electricians only advocate them for intermittent use, with the dirt and labour creating coal fires for general use. It is rather humorous. These coal fires require more oxygen than a gas-burner or gas-fire for effecting complete combustion. Yet they (like the gas-fire) perform a very real service in assisting, at a time of the year when doors and windows are often closed, in promoting ventilation. Then we should like to know from Mr. Wordingham something positive as to the "unbreathable and actively poisonous gases" that are given off by gas-burners. He is talking vaguely of something of which we should like more definite information. Gas has been in use in rooms for several years over a hundred; and before incandescent gas lighting came along, about seven times more gas had to be consumed to realize equal illumination from open-flame burners. Yet a robust England has grown up. The material and chemical evidence against Mr. Wordingham is vastly superior to the absurd postulation to which so many electrical men are very prone to give utterance. Then gas lighting makes dirt. Is Mr. Wordingham sure of his ground here? Is not the dirt already existing in the atmosphere? Perhaps he has not heard of the tests that Dr. Owens has been making lately upon this point of air contamination from domestic coal fires, which electrical men advocate for continuous use because their radiators are beyond the pockets of most people for such a purpose. Of course, dirt is insanitary; but will Mr. Wordingham kindly define for us in quantitative terms the contribution to the dirt in the atmosphere by the complete combustion of gas in a bunsen burner? As to the destruction of book bindings. The "JOURNAL" is now in its seventy-fourth year; gas has always been used in its offices for lighting, and for about thirty years for heating. We have all the volumes of the "JOURNAL" from the first in their original bindings. If Mr. Wordingham cares to call here, he can see them. Then our sympathies are with him, if he is so constituted that his friends are able to notice that gas has a depressing effect on his spirits. About electric radiators and cookers, if the report before us is a fair indication of what Mr. Wordingham had to say, he discreetly kept clear of the question of costs in connection with radiators and the hot-plates of cookers.

The Public Decides.

Turning to the practical side of the question, it is interesting to cast the mind back over the number of years during which electric radiators and electric cookers have been appealing to the public for favour. It is during those years that the gas-fire and the gas-cooker have made such vast strides in adoption. Why is this? Why has not electricity blocked the way of such an expansion in use of gas fires and cookers? Simply because the public decide in such matters; and the public verdict is that the greater range of practicability is found in gas. Therefore they have adopted it. In Great Britain and Ireland, upwards of 5 million gas cookers and grillers are connected. Even in the town in which the Sanitary Institute Congress was being held, there are in use 50,000 gas-fires and 30,000 cookers. Yet it cannot be said that the electricity people of Bournemouth are asleep. They are very energetic; but there is the opinion of the public, to which concrete testimony is given, that the balance of advantage in respect of economy, time, and work is on the side of gas. We do not overlook the fresh aid that municipal electricity supply undertakings have secured in obtaining statutory hiring powers through the Electricity Supply Act. Several undertakings have started on this business. One of the latest is the Croydon Town Council, who have decided to expend £2000 on electric cookers and motors to be let on hire.

Electricity in the Bath-Room.

In the "Memoranda" for Aug. 2, reference was made to the danger of electricity in bath-rooms. We do not for a moment suspect that the death of the Countess of Essex was due to an electric shock; but people are getting to know that to the use of electricity in bath-rooms, deaths have been due. In the "Star" the other evening, this paragraph appeared: "With reference to the death of the Countess of Essex in her bath, a scientific friend expresses surprise that the possibility was not mentioned at the inquest that she might have had an electric shock. He assures me that it is dangerous in the highest degree to touch an electric light switch while standing in water, and that in America so many fatalities have occurred in this way, that designers of bath-rooms now place, not merely the switches, but the lights, in positions where they can only be reached by getting out of the bath." This is quite good policy, but how many here will adopt it?

Natural Gas Production.

Figures announced by Mr. E. G. Sievers, of the United States Geological Survey, show that the production of natural gas increased 8 p ct. in 1920. The recorded production was 860,540 million c.ft., which included 62,330 million c.ft. of gas reported by the operators as wasted, most of it at the wells. The figure last quoted does not, of course, represent the entire quantity of gas lost, as there are further losses incurred in transmission and utilization. As a matter of fact, the consumption of natural gas in 1920 was 798,210 million c.ft., which was an increase of 58,294 million c.ft. About 36 p.ct. of the gas was consumed for domestic purposes, and the remainder for industrial uses. Up to within the last few years, over two-thirds of the gas was consumed in industrial establishments; but the recent tendency has been to conserve it for domestic use. There was an increase of 113,581 domestic consumers and a decrease of 3462 industrial establishments using natural gas in 1920. The value of the total consumption in that year increased 23 p.ct. on that of 1919. The value of the natural gas is being more and more realized, and many of the producers and distributors are obtaining increased rates, which will make the gas worth saving, and thus lead to more economical use.

Progress of Complete Gasification.—It would appear that the Sub-Committee on Gas Making of the Société Technique du Gaz are hardly *au fait* with the progress made in complete gasification in this country. "Certain processes," they say, "of which the English papers have spoken—such as the Davies and the Nielsen—are as yet but paper projects."

Collected Researches of the National Physical Laboratory.—There is to hand from the National Physical Laboratory a copy of Vol. XVI. (1921) of their Collected Researches. An opportunity will later on be taken of noticing some of the many matters that are dealt with therein; but meanwhile it may be stated for the information of readers that the volume is published, at the price of £1 net, by H.M. Stationery Office.

Income-Tax Tables.—The success which has attended previous editions of the income-tax tables and explanations compiled by Messrs. Oliver and Boyd, of Tweeddale Court, Edinburgh, and 33, Paternoster Row, London, E.C., is sufficient evidence of their usefulness, and the latest issue (a copy of which is just to hand) will in all probability, in view of the uncertainty on various points which appears to exist in many quarters, prove even more popular than its predecessors. The complicated income-tax and super-tax positions are presented in an intelligible and, as far as practicable, tabular form, designed to serve the purposes of both experienced and inexperienced people. The rates of tax and super-tax are set out, as well as the various allowances; and particularly helpful will be found the illustrations showing the rules in operation, and the legal position as summarized in "Reminders and Advice." The price is 1s. net, by post 1s. 2d.

Three-Light or Five-Light Meters.—It is stated by Mr. W. A. Castor, of the United Gas Improvement Company, Philadelphia, in the "American Gas Association Monthly," that there has been an investigation to determine the behaviour of three-light meters in use in that city, in comparison with five-light meters. Tests of a hundred of each size removed for some cause during the same period of time were tabulated; and while the number compared was not large, the results brought out the fact that the smaller meters, when installed in accordance with a properly worked-out meter schedule, can be depended upon to give satisfactory service. This, however, he says, cannot be done if the percentage of three-light meters owned is too high. In Mr. Castor's case, less than 5 p.ct. of the meters in service are of the three-light size, with only a normal stock on hand. In order to make the best use of the money invested, there should be no hesitation in using the three-light meters owned, provided the number is not so large in percentage as to force their use in positions known to need larger sizes. The percentage of three-light meters that may be thus installed will vary in different situations. For very good reasons, no three-light meters should be purchased, even if there is a class of consumer that requires no larger size. The smallest meter in a present-day schedule, in Mr. Castor's opinion, should be the five-light size.

HIGH-PRESSURE GAS DISTRIBUTION.

MITCHELL PATENTS.

For somewhere round about a century, Messrs. Drew-Bear, Perks, & Co., Ltd., have been established in Wellington Road, Battersea, S.W., in a large way of business in connection with constructional steel work, for which purpose they possess well-equipped modern works. They have, however, only recently entered the field of gas and water works contracting, where, under the altered conditions of to-day, they perceive good scope for their activities—being the patentees and makers of various specialities for use in high-pressure gas distribution. As a matter of fact, Messrs. Drew-Bear, Perks, & Co. are the promoters of the East Kent Gas Order under section 10 of the Gas Regulation Act, the application for which was last month heard by the Board of Trade. This Order proposes to apply a complete scheme for high-pressure gas supply—in bulk and in detail—over an extensive, and in some parts sparsely populated, area in the county named—the gas to be coke-oven gas obtained from collieries in the neighbourhood. [Further details of the proposals contained in the Order will be found on p. 379.] In addition to being prepared to undertake in this country schemes of the character indicated, together with high-pressure distribution on ordinary lines, we understand that the firm are interested in the distribution of coke-oven gas at high pressure, on a large scale, on the Continent. The whole proposal is intended to reduce capital expenditure.

The Consulting Engineer and Director of Messrs. Drew-Bear, Perks, and Co. is Mr. E. A. Mitchell, M.Inst.E.E., Assoc.M.Inst. Mech.E., who has made a special study in the United States of high-pressure distribution as applied to natural gas. His experience there led him to the conclusion that governors of the American type have their limitations; and he therefore set himself the task of improving upon them. Reporting on the Mitchell governor or regulator (which he tested in comparison with an American type of governor intended to serve the same purpose), a well-known Consulting Gas Engineer says: "I do not think any governor has yet been found to be so positive in its controlling action."

SERVICE REGULATOR.

With the American type of governor, it has been pointed out to us, the safety device (if any be fitted) consists of a blow-off pipe sealed in mercury. Any undue increase of pressure on the outlet side blows this seal, and the high-pressure gas escapes to the atmosphere, until the suppliers of the gas are notified. In the case of the Mitchell regulator, however, which the writer has been afforded an opportunity of inspecting, when the pressure unduly increases on the consumer's side, the gas is automatically and positively shut-off by a particularly neat and ingenious valve.

Fig. 1.—Mitchell's Patent Service Regulator.

The lever from the diaphragm to the inlet valve is also "compounded," which has the effect of greatly increasing the sensibility of the governor to variations of pressure. On test, with an inlet pressure of 10 lbs. to the sq. in., the outlet pressure was adjusted to 2 in. of water. The inlet pressure was then increased to no less than 100 lbs., which only made a difference of 6-10ths on the outlet. This, it should be stated, was an unusually severe test, and proves the Mitchell governor capable of maintaining a practically definite outlet pressure. Provision is made for access to the inlet valve without disturbance of the regulator or its connections—a feature that will be welcomed by users of the older types. The whole thing strikes one as being robust in design and absolutely fool-proof.

AUTOMATIC BOOSTER-COMPRESSOR.

In the high-pressure distribution of gas over large areas, it frequently happens that, in order to overcome the pressure drop in a particular district, the pressure at the main compressing station has to be kept unduly high. To take a concrete example, assume a distribution system designed for an initial pressure at the works of 30 lbs. Owing to the unexpected development of a district 10 miles distant, the pressure drop might be found to be 20 lbs., instead of the 10 lbs. contemplated—*i.e.*, only 10 lbs. being available for the area beyond, as against a calculated 20 lbs. To increase the initial pressure would be undesirable, and to relay 10 miles of trunk main would, of course, involve no little capital expenditure.

It is to overcome problems of this nature that the automatic booster-compressor has been evolved. Fixed anywhere near the 10 miles point where there is a branch main, this ingenious apparatus automatically boosts the pressure from 10 lbs. to 20 lbs., the exhaust being fed into the branch main referred to. There is no prime mover required, the energy being provided by the 10 lbs. gas pressure on the inlet side. It is really interesting to see, as the writer has done, one of these automatic machines connected-up, with an inlet-gauge pressure of 20 lbs., delivering into a receiver on which the gauge indicated 40 lbs.

The machine can be manufactured for any desired ratio of increment to suit particular needs; and the saving it offers in capital expenditure, maintenance, and labour charges need hardly be pointed out.

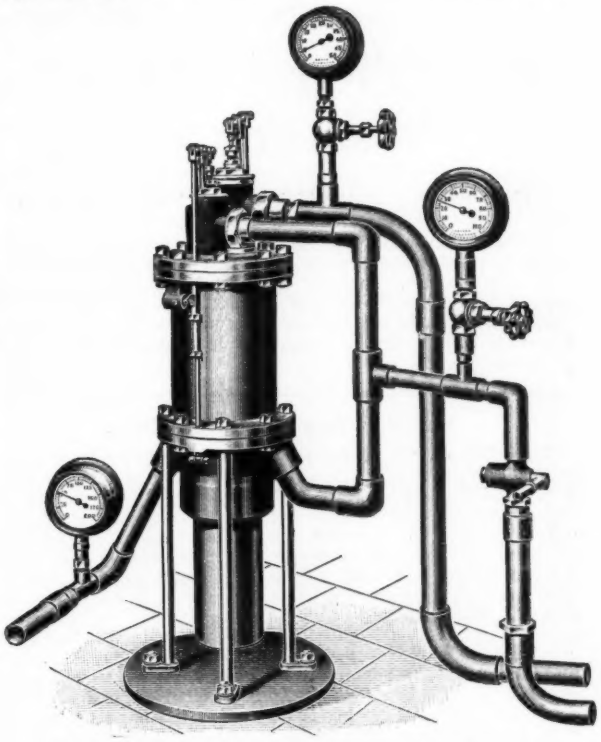

Fig. 2.—Mitchell's Patent Automatic Booster-Compressor.

HIGH-PRESSURE SERVICE ATTACHMENT.

The connecting of services to high-pressure mains has been the subject of much experiment; and there are several devices on the market designed to overcome the difficulty of effecting a satisfactory union of the service-pipe to the thin wall of the steel main. Here, again, Messrs. Drew-Bear, Perks, & Co. have got something good to offer. In America, it is stated, the universally adopted method is to use an attachment which is clamped round the main, and which is generally fitted with a cock of the ferrule type. It is, however, found that the joint between the outer surface of the main and the upper half of the clamp is a frequent source of leakage; and the Mitchell service connector is designed effectively to prevent this.

This process of making an under-pressure connection is as follows: The cock-body is clamped on the main, an insertion or leather joint being placed between it and the pipe. As will be seen from the diagram, the inlet to the cock is left of such a diameter as to permit of its being tapped. The main is then tapped, the feed being applied in the ordinary way. The combined drill tap is next withdrawn, the cock shut, and a nipple driver substituted for the drill-tap. The nipple, which is screwed externally with a tapered thread to follow the drill-tap, is afterwards screwed home,

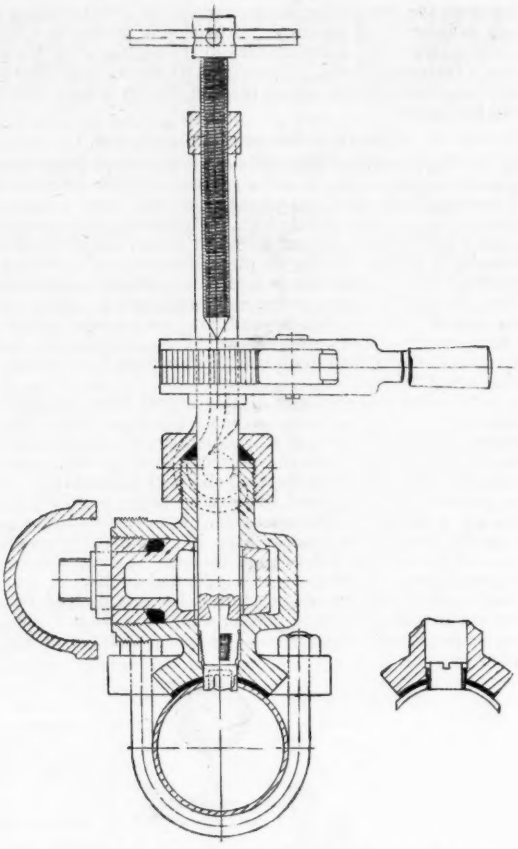

Fig. 3.—Mitchell's Patent High-Pressure Service Attachment.

being partly engaged by the cock-body; the bottom half engaging with the main. The edge of the joint is thus effectually sealed from the pressure. In order to prevent any leakage from the gland of the plug cock—always a potential source of trouble—the loose cap shown in the illustration is screwed-on. The cock is therefore completely shrouded, and is absolutely tight at all pressures.

Durability of a Wooden Gas-Main.

More than seventy years ago, when a gas supply system was installed in Canandaigua, there was laid in the principal street a 6-in. wooden trunk main 1800 ft. long. During a survey of the distribution system in the early part of this year, it was, says the "Gas Age-Record," decided that, since this wooden main had rendered such long and excellent service, it must be time to give it a well-earned rest. When, however, a section of the pipe was uncovered, this was seen to be unnecessary, for there was disclosed a remarkable illustration of the durability of a main of this material. Though it had been lying submerged in water, the wooden main appeared to be as sound as on the day it was laid, and the boring of a hole proved the inside to be as good as the outside. The thickness was found to be nearly 2½ in., making the outside diameter of the log 11 in. Chips from the boring indicated that there had been no seepage through the fibre, and the wood was not impregnated with an odour of gas. With the exception of a thin film on the inside of the pipe the wood was fresh and clean. In laying the pipe-line, one end of the log was turned down for a few inches to about one-half its original thickness, and this portion was inserted in the enlarged bore of the next length, an iron band being drawn tightly over the joint. This iron, the article states, had not survived as well as the wood, for several of the joint-bands were rusted through, and had to be removed.

Plans for a Smokeless City.—Mr. Floyd W. Parsons, in the "Gas Age-Record," says that plans are under way now in the United States to make one large city absolutely smokeless. This will be accomplished by selling gas at first for no more than $1 per million B.Th.U. According to present plans, the gas will be about 400 B.Th.U., and will be manufactured by a low-temperature, complete gasification process. A gas of exactly this quality has, he says, already been supplied to consumers, and there has not been one case of any trouble or difficulty having arisen from burning this kind of gas in the appliances that are now in use in the city referred to. At first coke will be used in the power plants of the city, so that smoke will be completely abolished. Later on gas will be consumed under the boilers.

THE PUMPING OF HOT LIQUIDS.

By WM. MASON.

Most chemical engineers are aware that difficulties are encountered in the pumping of hot liquids—that there is a limit to the depth from which a pump will draw water of a given temperature, this limit decreasing as the temperature increases; and that above a certain temperature it becomes necessary to supply the water to the pump under pressure. Not every engineer, however, is of the mathematical turn of mind to calculate the provision to be made under a given set of conditions; and it is to such that the author offers the present article, in which the difficulties are explained, and the method of circumventing them is set forth.

Fig. 1 shows diagrammatically the most usual condition. The actual vertical height through which the water is lifted is denoted by H, which theoretically should be measured from the surface of the water to the suction valves of the pump (when the water is at its lowest level). When the pump is started-up, a vacuum is created in the suction pipe, which enables the pressure at T to force the water up the pipe. Obviously, then, the depth H depends on the pressure obtainable at the surface of the water. Suppose the atmospheric pressure at the surface to be 14·7 lbs. per sq. in., then, since a pressure of 1 lb. per sq. in. will balance a column of water 2·3 ft. high, it follows that with cold water the pump should be able theoretically to lift the water a distance of $14{\cdot}7 \times 2{\cdot}3 = 33{\cdot}8$ ft. In actual practice, however, this cannot be done, due to leakage at the pump bucket and valves, and to friction in the suction pipe. Moreover, where the suction pipe is very long, or has a considerable number of bends, valves, and the

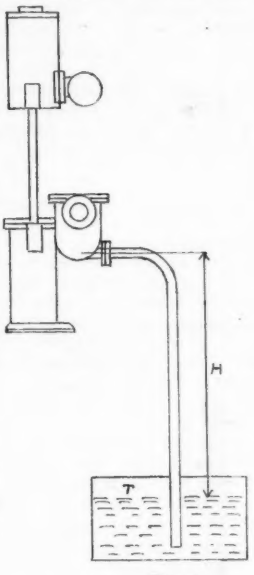

Fig. 1.

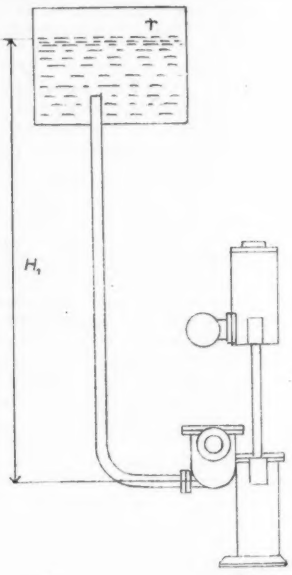

Fig. 2.

like, a further loss is encountered. With conditions somewhat as shown in fig. 1, it is found that a practicable value for H is about 0·75 of the theoretical—*i.e.*, $33{\cdot}8 \times 0{\cdot}75 = 25{\cdot}3$ ft., although it is possible that a newly-installed pump may be capable of improving slightly upon this.

But under different conditions new factors enter into the calculations, and extra allowances have to be made. In the presence of hot water, for instance, a factor called the "pressure of water vapour" demands consideration. The pressure of water vapour at any given temperature is the pressure which must be maintained in the water space if that temperature is to be maintained. Every engineer knows that at atmospheric pressure water can be heated to 212° Fahr., but that at this temperature it begins to evaporate. If the pressure be suddenly reduced below that corresponding to the temperature, the water will boil, and will continue to do so until the temperature corresponding to the new pressure has been reached. This is what happens in the case of the pump suction, and is the cause of the trouble experienced by the refusal of the pump to take the hot water. To prevent boiling, a part of the pressure available at T (fig. 1) must be sacrificed to make up for the loss of pressure created by the pump, the residue being utilized to force the water up the pipe. Table I. gives the pressure of water vapour at ordinary temperatures. Thus, suppose in the foregoing example the water, instead of being cold, had had a temperature of 180° Fahr., the pressure of water vapour corresponding to this is 7·51 lbs. per sq. in., which must be subtracted from 14·7 lbs. per sq. in. to get the available pressure at T (fig. 1) to force up the water: $14{\cdot}7 - 7{\cdot}51 = 7{\cdot}19$ lbs. per sq. in. This is equivalent to $7{\cdot}19 \times 2{\cdot}3 = 16{\cdot}5$ ft. head. Again, allowing 25 p.ct. for losses, we have $16{\cdot}5 \times 0{\cdot}75 = 12{\cdot}4$ ft., which is the height the pump will lift the water.

But there is another item which falls to be considered at times—namely, the elevation of the pump above sea-level. An atmo-

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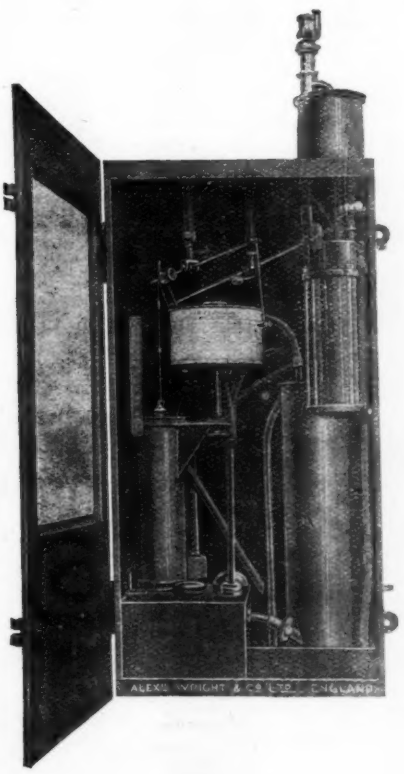

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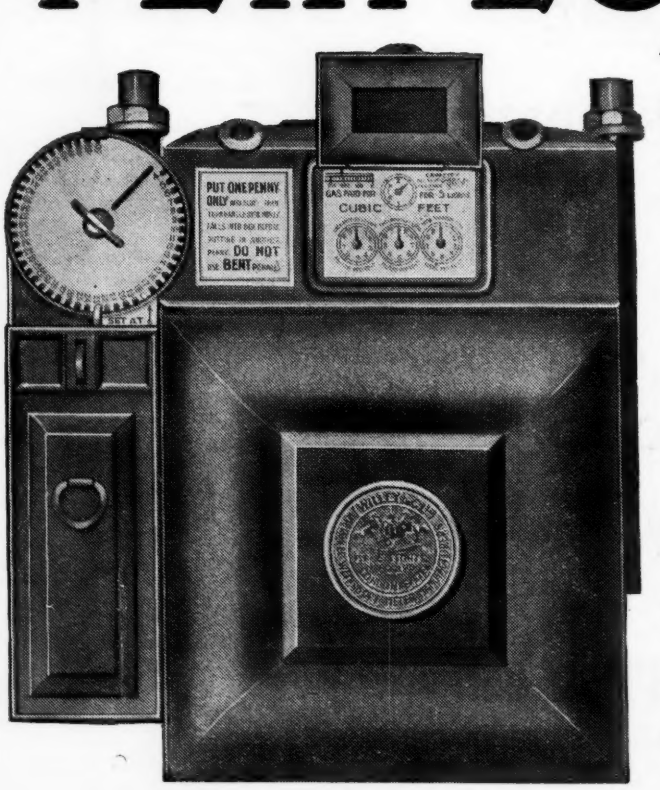

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TABLE I.—*Pressure of Water Vapour at Various Temperatures.*

Temp. ° Fahr.	Lbs. per Sq. In. Abs.	Temp. ° Fahr.	Lbs. per Sq. In. Abs.	Temp. ° Fahr.	Lbs. per Sq. In. Abs.
60	0·26	140	2·89	220	17·19
70	0·36	150	3·71	230	20·77
80	0·51	160	4·74	240	24·97
90	0·70	170	5·99	250	29·82
100	0·95	180	7·51	260	35·42
110	1·27	190	9·34	270	41·85
120	1·69	200	11·52	280	49·18
130	2·22	210	14·13	290	57·55

TABLE II.—*Atmospheric Pressure at Various Elevations.*

Elevation above Sea-Level in Feet.	Barometric Pressure, Inches Mercury.	Atmospheric Pressure, Lbs. per Square Inch.
0	29·93	14·70
500	29·39	14·43
1000	28·86	14·17
1500	28·34	13·91
2000	27·82	13·66
2500	27·31	13·41
3000	26·81	13·17
3500	26·32	12·93
4000	25·84	12·69
4500	25·36	12·45
5000	24·89	12·22

spheric pressure of 14·7 lbs. per sq. in. is obtained only at sea-level, and diminishes as the elevation increases; so that a pump situated 1000 ft. high cannot draw from as great a depth as at sea-level, since the pressure available to force the water up the suction pipe is less. Table II. gives the atmospheric pressure at different elevations up to 5000 ft., so that we are now in a position to fix-up the suction lift for a pump situated at any elevation, and dealing with water at any temperature. Still keeping to our previous example, assume that, in addition to the water being at a temperature of 180° Fahr., the pump is situated 2000 ft. above sea-level. The atmospheric pressure at this elevation is 13·66 lbs. per sq. in. Deduct pressure of water vapour: 13·66 − 7·51 = 6·15 lbs. per sq. in. Convert to feet head: 6·15 × 2·3 = 14·14 ft. Allow 25 p.ct. for losses, and the suction lift H under the new conditions = 14·14 × 0·75 = 9·43 ft.

Let us consider, now, the case in which the water is so hot that it has to be supplied to the pump under pressure. This state of affairs occurs when the pressure of water vapour corresponding to the temperature under consideration is greater than atmospheric, when it becomes necessary to supply from some outside source the excess of pressure above atmospheric which is required. These conditions are represented diagrammatically in fig. 2, where H_1 is the extra pressure required measured in feet head.

TABLE III.—*Suction Lift in Feet at Various Elevations and Temperatures.*

Elevation Above Sea-Level in Feet.	Temperature of Water in ° Fahr.							
	60°	80°	100°	120°	140°	160°	180°	200°
0	24·9	24·5	23·7	22·4	20·4	17·2	12·4	5·5
1000	24·0	23·6	22·8	21·5	19·4	16·3	11·5	4·6
2000	23·1	22·7	21·9	20·6	18·5	15·4	10·6	3·7
3000	22·3	21·9	21·1	19·8	17·7	14·6	9·8	2·8
4000	21·4	21·0	20·3	19·0	16·9	13·7	8·9	2·0
5000	20·6	20·2	19·5	18·2	16·1	12·9	8·1	1·2

Taking as an example a feed pump on board a modern steamship, drawing water from a heater at a temperature of (say) 220° Fahr. atmospheric pressure at sea-level = 14·7 lbs. per sq. in. Subtract pressure of water vapour at 220° Fahr.: 14·70 − 17·19 = − 2·49 lbs. per sq. in. Convert to feet head: 2·49 × 2·3 = 5·75 ft. Again, keeping 75 p.ct. efficiency: 5·75 ÷ 0·75 = 7·67 ft. —that is, the source of supply should be about 8 ft. above the pump suction valves, though it is probable that, in the example quoted, the heater would be placed much higher than this, advantage being taken of all the head room available. It will be noticed, too, that in this case the theoretical head is divided by the efficiency, since the difference has to be added.

TABLE IV.—*Head over Suction in Feet for Various Elevations and Temperatures.*

Elevation Above Sea Level in Feet.	Temperature of Water in ° Fahr.				
	210°.	220°.	230°.	240°.	250°.
0	−1·0	7·6	18·6	31·5	46·4
1000	0·0	9·3	20·2	33·1	48·0
2000	1·4	10·8	21·8	34·7	49·6
3000	2·9	12·3	23·3	36·2	51·1
4000	4·4	13·8	24·8	37·7	52·5
5000	5·9	15·3	26·3	39·2	54·0

In Tables III. and IV., H and H_1 have been calculated and tabulated for various elevations and temperatures—Table III. giving those cases where the pump is able to "lift" the water, and Table IV. the instances where the water has to be supplied to the pump under pressure. It will be observed in the latter that the "head" at sea-level and 210° Fahr. is given as −1·0 ft. This simply means that by calculation it is found that the pump will "lift" the water 1 ft. under these conditions. It should be noted also that Tables III. and IV. are calculated in the same way as the examples given above, for arrangements after the nature of figs. 1 and 2, and that under special conditions—such as long suction pipes—special treatment will be necessary.

EXPERIMENTS IN COAL PRESERVATION.

[From a Paper read by M. Forrières at the Annual Meeting of the Société Technique de l'Industrie du Gaz.]

This paper presented the results of some very complete laboratory experiments carried out with the view of determining the behaviour of similar coals, stored under the following typical conditions: With free access to air circulation; with restricted air circulation; and under water. The importance of wider knowledge of the subject need not be laboured; and an account of the methods adopted and detailed analyses should prove of considerable interest.

On Nov. 10, 1919, some five kilos. of "cobbles" were selected, free of bats and blinds, from a mixed lot of Marles and Bruay coals. These were carefully broken, and 2½ kilos. of fragments of the size of a small nut picked piece by piece; the parcel so formed being left exposed till Nov. 15 in a room at moderate temperature, in order that the excess of moisture might dry-off. Four lots free of dust were then weighed out, almost to a half-decigram.

One sample was placed in a litre flask, having an inlet-tube near the base; and both openings were left entirely uncovered. Thus the conditions of "free circulation" storage were reproduced. The next sample also went into a litre flask—this time without the lower tube of ingress—while the mouth was closed by a loose packing of cotton waste. This represented coals stored with a protecting covering; while the cotton took the place of a semi-porous topping of coke dust. The third sample was introduced into a container similar to the first, but with the lower tube stoppered and supplied with a cock, so as to permit the slow dripping of the distilled water which covered the coal (always to a minimum depth of 10 to 15 mm.). The mouth being left open to the air, the third condition was realized. The flasks were then left undisturbed in a room in which the temperature varied between 0° and 20° C.

These dispositions made, the remaining 600 grammes were immediately subjected to analysis, to determine friability, humidity, volatile content, and ash content. An improvised apparatus was used for the friability test. It consisted of a cylindrical sheet-metal box, having soldered to its ends a metal partition, in height equal to half the diameter. The sample was placed therein, and the whole spun on a lathe for five minutes at 120 R.P.M.; the contents being thereafter poured over a 3 mm. mesh screen. The weight of the dust passing the latter was taken as a measure of the friability; such procedure being undoubtedly permissible for comparative purposes.

No time was lost in passing to the humidity test, which consisted in drying 2 gramme samples by concentrated sulphuric acid under a bell, at atmospheric temperature and pressure; conditions preferred as avoiding both, the oxidation occurring at higher temperatures, and the loss of volatiles which would take place in a vacuum. The moisture determination took four days—before successive weighings showed no further decreases.

The volatiles test was carried out with non-dry coal—this being heated in a crucible, and the firing continued for one minute after the disappearance of the luminous flame—such a precaution guaranteeing a disparity of no more than 0·05 p.ct. in tests of similar samples. The ash content was determined by the incineration in a muffle furnace of the 2 gramme samples used in the moisture test.

The results of the analyses of the various samples are given below, and show clearly the considerable diversity in constitution effected by varied methods of storage.

—	Original Sample at Nov. 15, 1919.	Free Circulation, Nov. 15, 1919, to Jan. 16, 1922.	Restricted Circulation, Nov. 15, 1919, to Feb. 11, 1922.	Under Water (48 Hours' Subsequent Drying), Nov. 15, 1919, to March 24, 1922.
Original weight . . grs.	600	600	600	600
Subsequent analysis ,,	600	612·6	612·1	609·1
Friability . . . . p.ct. (as determined)	1·366	1·136	1·037	1·009
Humidity . . . . ,,	1·20	2·253	2·148	2·252*
Volatiles . . . . ,,	37·40	35·181	35·628	36·025*
Ash. . . . . ,,	2·20	2·225	2·114	1·921*
Fixed carbon. . . ,,	59·20	60·341	60·110	59·802*

* Mean determination of "nuts" and dust.

In the succeeding table, actual weighings are recorded; the

results being shown as percentage increases or decreases relative to the original weight:

—	Original Sample. Weight.	No. 1. Weight.	No. 1. Variation. P.Ct.	No. 2. Weight.	No. 2. Variation. P.Ct.	No. 3. Weight.	No. 3. Variation. P.Ct.
Humidity .	8·20	13·80	+68·2	13·15	+60·3	13·71	+67 1
Volatiles .	224·40	215·52	− 3·95	218·08	− 2·81	219·43	− 2·21
Ash . . .	13·20	13·63	+ 3·25	12·94	− 1·96	11·70	−11·36
Fixed carbon	354·20	369 65	+ 4·36	367·93	+ 3·87	364·26	+ 2 84
Total weight	600·00	612·60	+ 2·1	612·10	+ 2·01	609·10	+ 1·51
Coke . . .	367·40	383·28	+ 4·32	380·87	+ 3·66	375·96	+ 2·32

Although these figures speak for themselves, M. Forrières, in conclusion, called attention to their emphasizing the superiority of under-water storage—a scheme conceived before the war by his colleague, M. Rolland d'Estape. However, if storage in heaps protected on all sides but one is inferior to the under-water method, nevertheless it is pointed out as showing great advantages over "free circulation." Whereas in the latter case the volatile content diminishes by 3·95 p.ct., this figure is only 2·81 p.ct. with the air circulation restricted; and this gain of 1·14 p.ct. represents about 3 cub.m. of gas per tonne carbonized.

In the author's opinion, solid walls or (failing these) a wall on three sides improvised of stones or retort fragments filled-in with coal or coke dust, and a covering over all of fine screenings, provide the readiest and cheapest means of preserving stored coals in good condition.

SPONTANEOUS COMBUSTION OF COAL.

Various factors in the spontaneous combustion of coal are discussed by Mr. O. P. Hood, Chief Mechanical Engineer to the United States Bureau of Mines, in Technical Paper No. 311.

In storing coal, the risk per ton of spontaneous combustion is really very small, says Mr. Hood. If one counted the times a portion of coal was stored where it would be undisturbed for a few weeks, the number of such storage operations in any one year would amount to millions. Of these, a relatively small number show the phenomenon of spontaneous combustion. It is extremely rare that, in the smaller operations involving only a few tons, there is any heating. There is no spontaneous combustion of anthracite, and very seldom does the domestic consumer of bituminous coal find troublesome heating. The main interest in the subject lies in the large piles needed as reserves for public-service utilities and the industries.

Everyone desires to have directions for storage that are perfectly simple, and yet will ensure against loss. Unfortunately, the problem is too complicated for a simple solution. Many of the factors involved are difficult to determine, as there are no practical means of quantitative measurement. The factors involve chemistry, physics, and engineering; and the man who is in close contact with the problem of stored coal is not always a good observer in these several lines. The result is many incorrect theories, opinions, and prejudices. Much has been written on the subject, and the Bureau of Mines have published the results of extensive investigations; but the diversity of widely-held opinions shows that there is need of pointing out what are the factors that demonstrably are most concerned in the spontaneous heating of coal.

The heating of coal is believed to be a surface phenomenon. If a ton of bituminous coal should be delivered in a single cube, each dimension of the cube would be about 2·8 ft. When coal heats it is due to something that goes on with respect to the surface, and not something that happens inside of the piece. So far as is known, this is true no matter how finely the piece is divided. It is therefore interesting to know the area of the total exposed surface in a ton of coal. If the cube, having originally an area of about 47 sq. ft., be continuously sub-divided until all the pieces are fine enough just to pass through a 16-mesh screen, then the area of exposed surface in one ton of coal becomes an acre. It is perfectly obvious from this why it is that trouble from spontaneous combustion originates in fine coal, because the great increase in extent of surface does not begin until one gets below 1¼ in., or nut size. If fine coal is kept out of the pile, the heating surface is relatively so small as to remove the cause of spontaneous combustion. This remark applies, not to the fact that one may buy lump coal, but to the size of what actually gets into the storage pile. Coal bought as lump at the mine, and handled with modern disregard for breakage, may be far from lump coal when in the pile.

A unit of area of this coal surface generates a certain amount of heat, provided the coal can find the combining material—that is, oxygen. The amount of heat generated depends upon the temperature of a piece of coal. That is to say, coal put into storage at a temperature of 80° Fahr. will generate very much more heat per unit of surface than if put into storage at the temperature of 60° Fahr. It has already been a matter of observation that coal stored during the hot months of summer, and in heated regions, is much more liable to spontaneous combustion than coal stored in colder climes, and in cooler seasons.

Another most important factor is the freshness of the broken coal surface. For the first few days or weeks, the freshly-broken coal surface is very much more active in the taking-up of oxygen, and consequent production of heat, than after a few weeks or months—a fact that must be borne in mind when considering the wisdom of crushing coal immediately before storing it. Spontaneous fires rarely occur after the coal surfaces have been exposed for three months. As the rate of heating increases with the temperature, it is evident that, if the heat generated is not removed, the process becomes a self-aggravating one, and the rate of heat generation, instead of falling, may rise with time. If the temperature of the pile reaches 140° or 150° Fahr., and continues to rise, there is a high probability that within a few weeks a destructive temperature will be reached. If the temperature reaches 160° or 180° Fahr., there is almost a certainty that a destructive temperature will be reached, and that the coal must be moved. Immediately the question of getting rid of the heat is presented.

A coal pile is cooled by radiation, and by the movement of air through it. Air moves rather freely through a pile of coal, and in many piles of coal this natural change, or breathing, of air is enough to carry away the heat generated. Some observers have stated that, in general, fires in large coal piles are found in the region from 5 to 8 ft. below the surface on the flanks of the pile. The rise in temperature of a coal pile is thus intimately connected with a very complicated ventilating problem, and there are no means of observing or measuring these small and wayward ventilating currents. Since there are no means of knowing just what the ventilation is in any given portion of a pile, there is great hesitancy in advocating ventilating schemes for coal piles, as one is as likely to make trouble as to prevent it, unless extreme and uniform ventilation is assured.

There are many more factors of minor importance. One of the troubles has been that undue attention has often been given to the minor factors—such as the sulphur or the volatile-matter content of the coal, height of pile, &c.—while the main factors—such as initial temperature, breakage in handling, freshness of the coal, and the screening before storage—have been overlooked or minimized.

Long-Distance Main Protection.

The City of Cincinnati is heated to-day almost exclusively by gas. Much of its residential area is still lighted very largely by gas, and a great many of its giant industrial plants are operated by gas. As a result, enormous quantities of gas are required in the city each day, and this comes through large cast-iron mains, a distance of 200 miles and more from the West Virginia natural gas fields. Just before entering upon its long journey, says Mr. Felix J. Koch, writing in the "American Gas Journal," the gas passes through apparatus for removing gasoline from the gas. This apparatus does its work very thoroughly, but there is always some gasoline vapour left behind. This flows along with the rest of the gas until somewhere it meets with extra cool temperatures. Then it condenses, and flows to "pockets," where it may rest. It is not long before wily countrymen of the locality come to know just about where such pockets may occur, and soon they find a way of tapping the mains at such a place. They draw the gasoline, mix it with naphtha from the general store at the cross-road—for it is altogether too high-powered a fluid for use in their cars as it stands—and then they are off and away with it for running their tractors and their pleasure automobiles. It is not the taking of the gasoline the Company object to so much; for, as a matter of fact, the less gasoline there is in a pipe the more room remains for the gas to flow through. What they really do object to is the damage done in the crude method adopted of tapping the pipes. To prevent this as far as possible, the Company have to provide mounted police to look after the pipes.

Contamination of Air with Carbon Monoxide.—Messrs. Henderson and Haggard, of Yale University, in a contribution appearing in the "Journal of Industrial and Engineering Chemistry," draw the following conclusions from experiments in which the period of exposure to carbon monoxide was several hours. The time of exposure in hours is multiplied by the concentration of the carbon monoxide in parts per 10,000 of air. If the product equal 3, no perceptible physiological effect is noted; if it equal 6, the effect is just perceptible; if it equal 9, headache and nausea are produced; if it equal or exceed 15, conditions are dangerous to life. Exercise and physical work increase the rate of absorption of carbon monoxide from a contaminated atmosphere. Upon return to fresh air, the carbon monoxide which has been absorbed by the blood is excreted through the lungs. From 30 to 60 p.ct. of the absorbed carbon monoxide is excreted hourly.

A French opinion of the sale of gas on the heat-unit basis appears in the report of the Sub-Committee on Gas Making to the Société Technique du Gaz. They state that the adoption of the therm in England has given rise to wide discussion, whereas in France, although the thermal basis is in vogue, the avoidance of a new unit has obviated the confusing of consumers—with little attendant advantage; and they have preserved the simplicity of the metric system. A therm is the equivalent of 25·2 major calories.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Trade Press and the Public.

SIR,—Your "Editorial Notes" are usually interesting; but at times they contain matter which would bear more fruit if it appeared in the "Daily Press."

The four paragraphs of your first editorial in this week's issue were better addressed to the public than to the readers of your "JOURNAL," who need no convincing.

As a shareholder taking an intelligent interest in gas, it appears to me that *publicity* is required to prove our case, and that reiteration in the Trade Press does us little, if any, good. With many apologies,

H. F. PARDY.

Highgate, N., Aug. 10, 1922.

[Our correspondent writes with very good intention, but without knowledge of the facts. While the "JOURNAL" is a trade and technical paper, its subscribers are not confined to the technical, administrative, commercial, and manufacturing sections of the gas industry. It circulates among directors, shareholders, and members of gas staffs who are not technical men. Our subscribers also include Parliamentary authorities, Government departments, officials of local authorities, and public libraries; and when an editorial appears in our columns such as that referred to by Mr. Pardy, copies are sent to the editors of the papers to which particular reference is made. Having this information in his possession, perhaps our correspondent will see reason for the "JOURNAL" not being too exclusive in the character of the editorial work that appears in its pages. Besides, we cannot afford to allow a public agitation of the kind to pass without allusion. That would look as though we had not a defensive word to say on the subject.—ED. G.J.]

Dearer Gas.

SIR,—I notice in your issue of the 9th inst. a communication from Mr. D. H. Helps, enclosing a copy of a letter he addressed to the "Daily Mail," dealing with their present agitation; but though I have scanned the paper pretty thoroughly, I have not so far seen it published. Enclosed is a copy of a letter I sent them from Felixstowe on Aug. 1, and which has met with the same fate.

This attitude certainly opens one's eyes to the unfair methods adopted by certain sections of the Press in dealing with these "stunt" agitations.

ALFRED R. BARFORD.

19, *Braxted Park, Streatham Common, S.W.,*
Aug. 12, 1922.

[ENCLOSURE.]

To the Editor of the "Daily Mail."

SIR,—I am absolutely amazed at the ignorance displayed in the letters of some of your correspondents, and, if I may say so without offence, some of your own editorial notes in dealing with the subject of "Dearer Gas."

In your columns this morning appears a letter from an old Gas Official to the Nottingham Gas Department, who speaks of a cubic foot of gas containing 500 heat units "*or therms.*" Surely by this time the Man in the Street knows that a therm equals, not 500 B.Th.U., but 100,000 B.Th.U. (British Thermal Units), and to see such a gross misstatement from a late gas official is really amazing. Then, again, he states that, "instead of paying for cubic measure, you are paying for heat units you cannot use, because a proportion of your available heat is lost, because it cannot be enclosed on the particular work required to be heated." If one stops to think for only a moment, one must see the fallacy of such an argument in favour of cubic foot measure as against heat unit measure, as whatever the basis of charging, the losses are precisely the same, and you pay for those losses whether charged in cubic feet or therms. Again he states that "no one, so far as he knows, protects the public by combination, &c.;" but it seems incredible to me that he does not know of the appointment of a public official as gas examiner by practically every public body in the country, whose duty it is to check the quality of the gas supplied. The gas companies are under very heavy penalties should they fail to supply gas up to the quality (in heat units) specified and declared under their Acts of Parliament, with the result that they invariably supply gas of rather higher quality than they are under contract to furnish.

In your editorial notes you have referred to gas as being "obviously of poor quality;" but I should like to point out that this is precisely where the consumer gets protection under the therm basis of charging, whereas no such protection existed under the old cubic foot basis of charging. Under the old basis we might take two gas companies, both charging (say) 4s. per 1000 c.ft., the one company supplying gas of 550 B.Th.U. (or heat units) and the other (say) 400 B.Th.U. It might be argued that their charges were the same. So they were, but the company supplying the 550 B.Th.U. gas were giving 37 p.ct. better value to their consumers by supplying them with 150 more heat units in every cubic foot of gas supplied. It follows, therefore, that under the therm basis of charging we are paying for just what we get, and nothing more.

Might I say that your comments on the Gas Light and Coke Company's letter, appearing in your issue to-day, strike me as being very wide of the mark. But as I do not wish this letter to be too lengthy for insertion, I will leave them for others to deal with. Suffice it to say that the coal strike must have been an enormous factor in the situation so far as the June, 1921, quarter was concerned, as it was not so much a question of whether the consumers could use less, as that they were compelled to use less, because at certain hours of the day the pressures were cut down very substantially at all gas-works, and I think in several towns the gas was cut off altogether owing to the shortage. This fact, coupled with the remarkably warm weather right through the spring and summer, when gas-fires were not needed, must of necessity have had an enormous effect on consumptions.

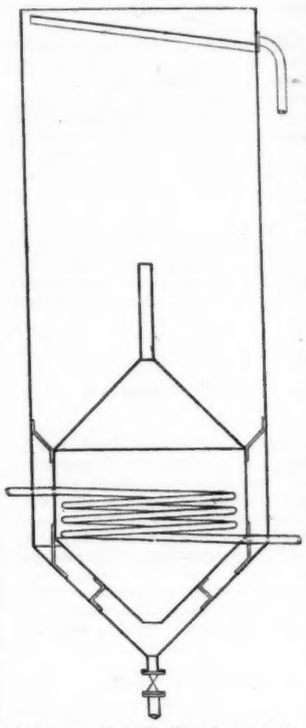
Aug. 1, 1922. (Signed) ALFRED R. BARFORD.

REGISTER OF PATENTS.

Separating Water from Coal Tar.—No. 163,011.

BISMARCKHÜTTE, of Oberschlesein.

No. 12,794; May 6, 1921. Convention date, May 6, 1920.



A German Dehydrating Apparatus.

This invention relates to a method of, and apparatus for, separating coal tar from its aqueous content, and depends on the fact that tar is of heavier specific gravity than water. It is projected in an upward stream against the undersurface of a separating plate relatively slightly inclined to the horizontal, so that the water carried with the continuously projected stream of tar creeps up the plate and over the upper edge thereof, while the tar travels down the undersurface of the plate. The illustration is of one form of the apparatus.

The tar in the interior container is heated by a coil, and thus given a considerable upward tendency, so that a stream is projected upwardly with a sufficient velocity to impinge against the separating plate, whereupon the water carried with the tar is separated and adheres to the under surface of the plate, traversing upwardly until it creeps over the upper edge.

Practical experience has shown that satisfactory results are obtained when the tar is heated to a temperature of 50° to 65° C. In the course of twenty to twenty-four hours the water contained in the tar was reduced to 3 or 4 p.ct.

Apparatus for Charging and Discharging Retorts.

No. 182,888.

SCOTT-MONCRIEFF, W. D., of Brighton.

No. 10,227; Aug. 18, 1921.

This invention relates to apparatus for charging and discharging retorts, of the kind wherein the material to be heated in the retorts is arranged on a series of trays detachably mounted one above the other on a support, whereby the series of trays can be introduced into, and removed from, the retort by means of an overhead traveller or trolley.

In order to facilitate the introduction into, and removal of, the trays from the support or cradle, the securing means are arranged to engage with the lowermost tray, so that the trays of the series can be successively introduced into, and removed from the lower end of, the support or cradle. By this means the trays may be conveniently piled and unpiled in steps by successively raising and lowering the cradle. For this purpose the cradle consists of a frame adapted to guide the trays either peripherally or internally, and to retain the lowermost tray therein by means of interengaging projections on the tray and frame which can be brought into and out of engagement with each other—*e.g.*, by relative rotation of the tray and frame.

The trays are provided with means, such as distance pieces with male and female centres, for supporting them one on the other at a suitable distance apart; while the cradle or support for each set of superimposed trays consists of a series of sling rods attached to the lid of a retort and provided with horizontal surfaces, such as notched rings, adapted to be brought into and out of engagement with projections on the trays. In a modification of the apparatus, the trays may be provided with substantially centrally arranged apertures adapted to fit loosely on to a carrier in the form of a rod having projections capable of being brought into and out of engagement with corresponding snugs or projections in the apertures in the trays.

The sets of trays, after carbonization, are placed on a roller-track comprising a platform on which the trays are separated, and are transferred to a tilting section whereby they are emptied; the cradles being emptied and filled on platforms on the roller-track by means of hydraulic cylinders mounted on swing frames.

In a modification of the apparatus to facilitate the charging and discharging of retorts with viscous or other liquids, the superimposed trays are provided with short stand-pipes acting as overflows from the top tray to the bottom of the superimposed trays.

Thermostat for Water Heaters.—No. 182,915.

RYAN, B., of New York.

No. 10,658; April 12, 1921.

This invention relates to a thermostatic control for hot-water gas heaters, and more particularly to that class of device which completely shuts off the gas supply to the heater, leaving perhaps a pilot light burning for the ready ignition of the gas when again turned on, as distinguished from those devices which merely check or throttle the supply of gas to the heater. In devices of the character first-named—that is, which completely shut off the supply of gas to the heater—the principal difficulty to be overcome for successful operation has been to effect a sufficiently wide and quick opening of the supply valve, and also to effect the quick movement of the valve when it is to be closed. The ordinary gas heater most commonly used at the present time is of the bunsen type, which requires a proper ratio of gas to air in the mixing chamber for proper combustion and to prevent back-firing. Therefore in these gas control devices it is necessary to open and shut the valves to and from the minimum gas supply adjustment with a quick movement.

A further object is to provide a device which will operate with equal effectiveness for different adjustments, and that can be adjusted for efficient operation in places of different climatic temperatures.

According to the invention, a thermostatic control of gas water-heaters, of the type wherein the gas valve is operated through the action of a thermostatic member and a magnet, has the valve-lifting member operatively connected to the thermostat in two parts; the valve carrying part being pivotally mounted on the other part, and also connected thereto through a spring which governs the relative movement of the two parts.

In a further specification No. 182,916, the patentee claims to improve the construction of thermostatic controllers for gas water-heaters, so as to facilitate manufacture, reduce the cost, and enable rapid and accurate adjustment, and further to ensure the positive operation of the device at all times. Also to protect the valve and valve seat from being fouled while the control device is in transit.

Incandescent Burners.—No. 182,952.

SMITH, J., and JACKSON, W. E., both of Birmingham.

No. 11,158; April 18, 1921.

This invention has for its object to provide a burner which will be effective in use, and which is of extremely cheap and simple construction. It comprises in combination a nipple, the lower end of which is screwed to secure it on the gas pipe and the upper end provided with a plain cylindrical portion, a tube fitted on the plain cylindrical portion of the nipple and having a friction-tight sliding fit thereon, a cap fitted on the upper end of the tube with a friction-tight fit thereon, and a mantle support carried by the cap.

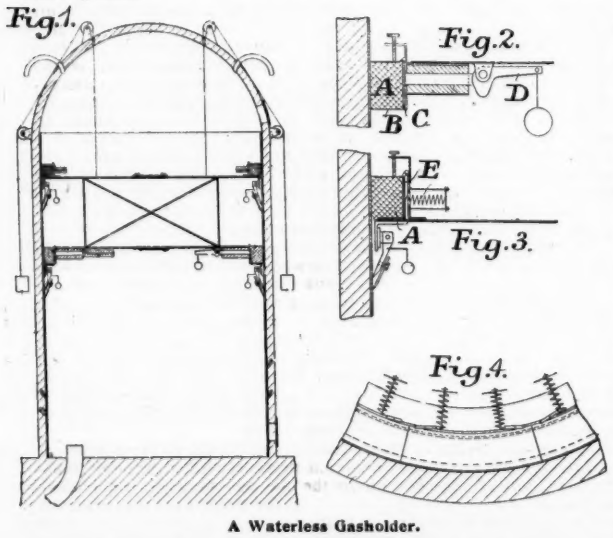
The claims also include the double cranking of the mantle support, so as to bring the main portion of the support away from the mantle, and the provision of a gallery, secured in position by forcing or pressing, for carrying a shade.

A Waterless Gasholder.—No. 182,959.

HARTMANN, C., of Schwerte-on-the-Ruhr, VAUDT, W., of Dortmund, and ADLER, N., Essen-on-the-Ruhr.

No. 11,584; April 21, 1921.

This invention relates to a gasholder of novel construction and novel manner of operation, its foundation, its wall, and its dome being made integrally of reinforced concrete. The top of the gas space of the gasholder consists of a vertically movable structure, which is packed with respect to the inner wall surface by a substance specially devised for the purpose. The advantages obtained by the construction consist in obviating a deep foundation, rendering freezing impossible, and making heating consequently unnecessary, obviating a layer of oil, increasing the stability and the strength of the holder, and, finally, reducing the building costs.



A Waterless Gasholder.

Fig. 1 is a vertical section through a holder constructed according to the invention; and figs. 2, 3, and 4 are details drawn on a larger scale.

The foundation, the side wall, and the dome consist of one integral piece of reinforced concrete. The wall has at its inner surface a lining consisting of sheet-iron plates welded together and connected with the walls by lugs, which are welded to the lining and imbedded into the concrete of the wall, acting as a reinforcement. This latter and the lining are thus practically one body, which has very great strength, and is capable of resisting all influences of the weather or of the atmosphere respectively. The dome has a plurality of curved ventilating tubes downwardly bent so as to prevent dirt and dust from entering, but permitting the escape of gas that may have leaked between the wall and the movable structure. This structure and the dome have each a man-hole. The gas enters through a pipe in the foundation.

The movable structure consists of two circular sheet-metal discs rigidly connected with each other. A man-hole is arranged in each of them. The whole structure is suspended from four ropes, of which only two are shown in fig. 1. Each rope runs over a pulley, and has a weight at its free end.

Instead of counterbalancing the movable tops by ropes and weights, a brake piston may be employed. This may be built-in either above or below the movable structure (according to the size of the holder, and consequently the weight to be counterbalanced); and either the brake piston or the cylinder may be carried by the discs. The cylinder contains oil, which flows through ports in the piston.

The packing material used for making gas-tight the vertically movable sliding structure at the side wall consists of a mixture of oxide of zinc, preferably 40 p.ct., lead oxide 40 p.ct., olive oil 10 p.ct., and gourd-core oil 10 p.ct. It has thus a considerable quantity of vegetable fats, whereby a uniform unvariable consistency of the packing or of lubricant is ensured, so that it neither hardens nor becomes liquid, but has always the necessary viscosity to be able to compensate all inequalities between the movable sliding structure and the holder wall. The packing means, while acting as a lubricant, prevents also the formation of rust on the wall. The packing material forms two continuous rings A, A, one at the top disc, the other at the bottom disc of the movable structure. It is held in place by specially devised receptacles, of which various examples are shown in the drawings. In the form of construction shown in the right-hand half of fig. 1 at the lower disc and in fig. 2, segment shaped boxes, which are open next to the wall, contain the packing material A. The upper wall of each box B is hinged to the rear or inner wall (see figs. 2 and 4), whereas this latter wall and the bottom are firmly affixed to the disc. The upper wall or lid may be kept closed by a screw as shown. Within each box or receptacle is a movable vertical wall C, which is affixed to a radially arranged horizontal rod guided in a sleeve. The rod projects beyond the inner end of the sleeve, and is subjected to the pressure of a weighted lever D, whereby the packing material is constantly pressed against the holder wall. In the form of construction shown in the left-hand half of fig. 1 (also at the lower disc of the movable structure), the weighted lever D is replaced by a spring. In other respects the arrangement is the same as before described.

Referring now to the tightening arrangement for the upper disc (as shown, by way of example, in figs. 1, 3, and 4), the receivers E for the packing material are angular in vertical section and displaceable upon the disc. To press the packing material against the wall, each of the segment shaped receivers is constantly subjected to the pressure of a spring abutting at its free end against a plate, rigidly connected with the respective portion of a ring affixed to the disc. The lid is in this example hinged not to the receiver E, but to the ring.

In order to keep the inner surface free from precipitations or deposits separated from the gas, scrapers are provided between the two discs, as well as below the lower disc. The edge of each scraper is curved according to the curvature of the gasholder wall, and is pressed against this latter by a weighted lever.

Stuffing-Boxes for Gas-Meters.—No. 183,079.

SMITH, E. W., and SMITH METERS, LTD., both of Kennington Park Road, S.E.

No. 29,302; Nov. 3, 1921.

This invention relates to stuffing-boxes or glands of the kind made in two parts superposed and adapted to hold different substances—say, vaseline in one part and packing in the other. The type has been used with various machines (including gas-meters), and has been made with the two parts adapted to be screwed together; a portion of one part being used as a guide for the rod passing through the stuffing-box.

The invention consists of a particular construction for use in gas-meters, and in which one part or member has an external shoulder to form a washer-seating, and has also an inside flange forming a guide for the rod. The flange is extended and externally threaded, while the other member is internally threaded to receive the extended flange, and has its end adapted with the above-mentioned shoulder, to hold a washer to seal the joint between the two members.

Neutralization and Drying of Sulphate of Ammonia. No. 183,089.

WEYMAN, G., of Gateshead-on-Tyne.

No. 32,216; Dec. 1, 1921.

This invention relates to a process for the production of a substantially dry and neutral sulphate of ammonia. In the manufacture of commercial sulphate of ammonia, there is always an excess of acid present; and it has previously been proposed to neutralize this either by spraying an alkaline solution on the surface of the salt in a centrifugal machine, when it may afterwards be dried by external heat, or by mixing the salt with a neutralizing agent in a separate mixing machine after the salt has been centrifuged. Among neutralizing agents suitable for this purpose, it has been proposed to use ammonium carbonate either in the solid state or in solution; the carbonate being added in minimal quantities for neutralizing the acid present. These processes, the patentee says, present certain disadvantages.

The invention consists in adding a neutralizing agent in solid form,

preferably as powder, to the acid salt, while it is being centrifuged; and the neutralizing agent should be one which is capable of giving off a gas when in contact with the warm salt in the centrifuge. It is preferable to add the neutralizing agent after the bulk of the mother liquor has been expelled, and to add it so that it becomes spread upon the inner surface of the larger crystals in the lower part of the basket of the centrifuge. The remaining liquor, which travels mainly upwards and outwards, will then carry the neutralizing agent (or the gas evolved therefrom) sufficiently into and through the crystals in the basket. The neutralizing agent may be discharged, for example, from an opening by compressed air or other means, or it may be distributed by a mechanical spreader, so as to impinge on a distributing ring or the like (outwardly flying chains, for example) carried round on the base of the spindle supporting the basket.

The reagent—for example, commercial ammonium carbonate—is partially or wholly decomposed on the warm surface of the salt, liberating gases containing ammonia, which latter neutralizes the acid near the surface. The acidity being reduced, the centrifugal separation of mother liquor continues. It is not generally advisable to neutralize the salt completely in the basket, in view of the possible corrosion of the copper basket. The neutralization is completed, as the hot salt is discharged, by the continued decomposition of the neutralizing agent; the gases evolved penetrating the mass and assisting in carrying off further water vapour. In this way neutralization is completed while the salt is sensibly hot, and is in effect dried by evolution of water vapour in its hot state without application of heat other than in the salt as discharged from the saturator. By this method salt may be prepared containing over 25·50 p.ct. of ammonia and less than 1 p.ct. of moisture.

It has been found that, although the neutralizing agent is added to the salt while the latter contains a considerable amount of mother liquor, the amount required to produce a neutral salt is no more, and may be substantially less, than the amount chemically equivalent to the free acid normally remaining in the centrifugal salt. It will be realized, then, that by adding a solid reagent in a dry pulverulent condition in the centrifugal machine while the separation of mother liquor is being effected, the separation is facilitated, and a neutral and substantially dry salt results without the application of external heat, or the use of mechanical mixers or the like.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 10.]

Nos. 20,834 to 21,489.

BRANDES, F. W.—"Production of coke from inferior fuel." No. 21,154.
BRANDES, F. W.—"Utilization of peat, &c." No. 21,015.
BYWATER, D.—"Hand-operated valves." No. 21,147.
CHITTENDEN, E. J.—"Gas-mantle grip." No. 21,407.
CHIVERTON, H. W.—"Combination gas-ring." No. 20,842.
COOPER, W. R.—"Gas-meters." No. 21,241.
DANAHER, J. W.—"Gas-meters." No. 21,024.
ERDÖLL-UND KOHLE-VERWERTUNG AKT.-GES. and ERLENBACH, E.—"Process for catalytic cracking of hydrocarbon oils, tars, &c." No. 21,048.
EVANS, H. P.—"Gas-saving plates." No. 20,981.
GIBSON, R. E.—"Apparatus for charging furnaces of gas-retorts." No. 21,317.
GILLISON, J. W.—See Chiverton, H. W. No. 20,842.
ILLINGWORTH, S. R.—"Treatment of shale, coal, &c., for removal of sulphur." No. 21,011.
KENNEDY, W. J.—"Valves for gas-burners." No. 21,213.
KILBURN, B. E. D.—"Cooling incandescent coke." No. 21,099.
KIRSCHMANN, L.—"Gas-burner." No. 20,899.
MACDONALD, D. M.—"Apparatus for analysis of coal gas, &c." No. 20,990.
MITCHELL, W. A.—"Pipe, &c., couplings." No. 20,890.
NEW INVERTED INCANDESCENT GAS LAMP COMPANY, LTD.—"Gas-nozzle regulators." No. 20,889.
NICOLL, H.—See Gibson, R. E. No. 21,317.
PARTLOW, H. W.—"Gas-governors for type-setting machines." No. 20,921.
PASCALL, F.—"Combined heating and cooking stoves." No. 21,132.
PEMBER, A. H. & H.—"Gas-regulators for atmospheric gas-burners." No. 21,082.
PERRY, W. P.—"Apparatus for distilling carbonaceous material." No. 21,010.
PETRIE, A. A.—"Automatic valve device for apparatus using gaseous vapours." No. 21,094.
REISS, C.—"Gas-nozzle regulators." No. 20,889.
RISBRIDGER, W. A.—See Bywater, D. No. 21,147.
ROSS, R. C.—See Mitchell, W. A. No. 20,890.
SCOTT, G. W. & S. W.—"Gas-tight faucet stoppers, and levers for rotating same." No. 21,457.
SOC. ASTER.—"Liquid-meters." No. 21,266.
STANDEN, H. S.—See Evans, H. P. No. 20,981.
SULZER FRÈRES SOC. ANON.—See Kilburn, B. E. D. No. 21,099.
THOMPSON, A.—"Gas-pans, and method of producing same." No. 21,189.
THOMPSON, G. H.—"Device for controlling flow of fluid pressure." No. 21,178.
WELLINGTON, S. N.—See Cooper, W. R. No. 21,241.

Another Reduction in Price at Brentford.—The Brentford Gas Company announce a reduction in the price of gas by 2d. per therm to 11d., to take effect from the Michaelmas quarter. The reduction, which is the third that has taken place in the present year, is equal to 9½d. per 1000 c.ft. The 11d. per therm will bring the Company to the same figure as the Gas Light Company.

MISCELLANEOUS NEWS.

COKE-OVEN GAS FOR EAST KENT.

An Interesting High-Pressure Distribution Scheme.

Interesting proposals for the distribution at high pressure of coke-oven gas over an extensive area are made in connection with an application by Messrs. Drew-Bear, Perks, & Co., Ltd., of the Battersea Steel Works, Wellington Road, S.W. (a well-known firm of constructional engineers), for a Special Order under section 10 of the Gas Regulation Act, which has been recently heard by the Board of Trade. Illustrated details of the special devices by the aid of which it is intended to carry the scheme into effect will be found on p. 373 of this issue.

The proposals of the East Kent Gas Order relate to a complete high-pressure gas supply scheme to the area scheduled. Great progress has, of course, been made in respect of the supply of high-pressure gas in the United States; and the applicants feel that this method possesses some very distinct advantages for the supply of areas which are of a rural character, or which consist of a number of what might be termed straggling communities. In the first place, it is pointed out, it is unnecessary, in the early days of the scheme, to burden the undertaking with a large amount of unprofitable capital expenditure to provide for increased demands in the future. It has been found in America that, where there is provided a system of high-pressure gas distribution, as the demand grows the requisite quantity of gas can be supplied by increasing from time to time the pressure; and in this way capital expenditure is avoided.

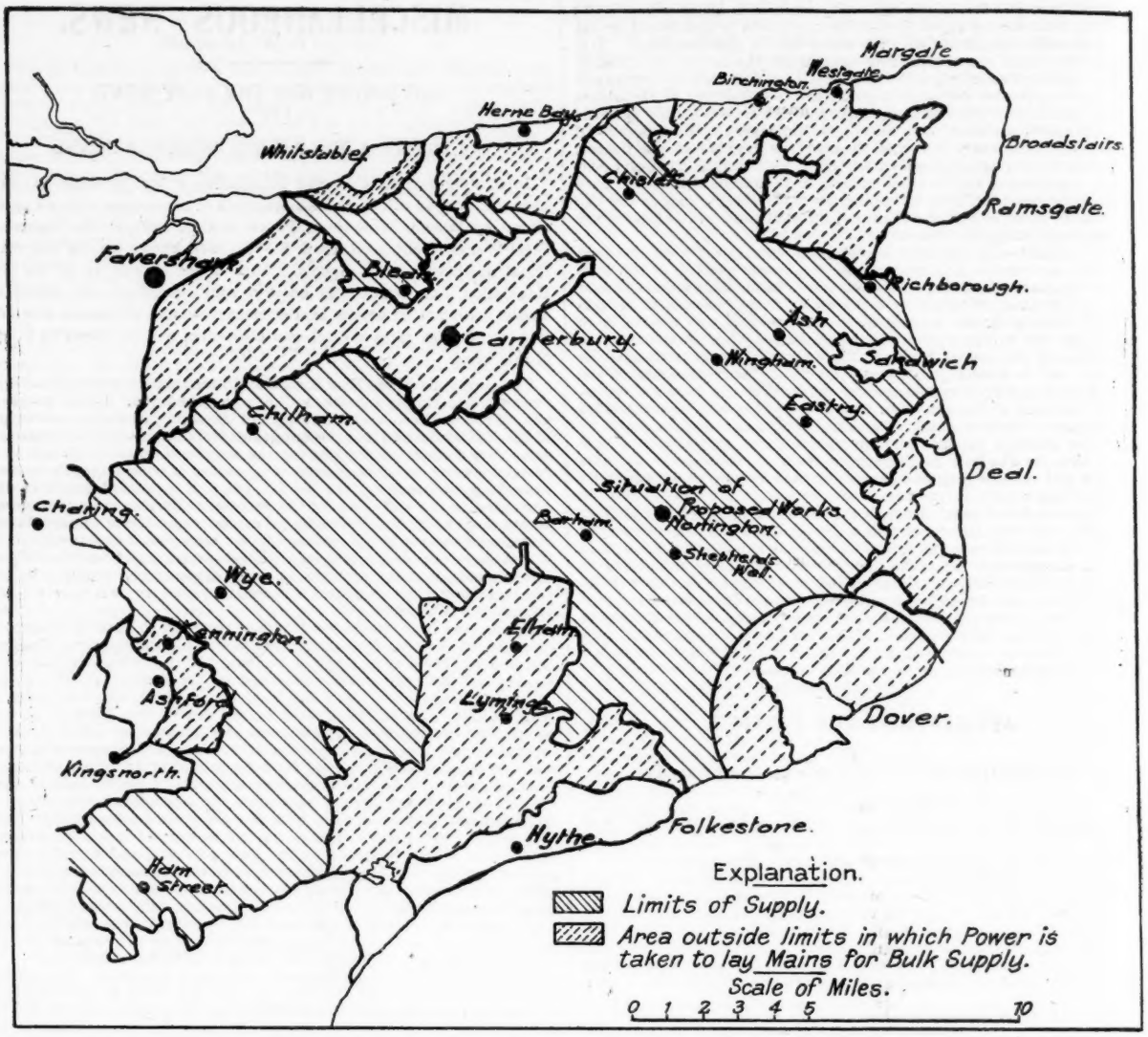
In this case the question is not one of resorting to local increases of pressure, but of providing one homogeneous high-pressure scheme for the whole of the district; and in working out the proposals, the promoters will have the great advantage of the services of Mr. E. A. Mitchell (a Director of, and Engineer to, the firm), who has made a special study, both in the United States and in this country, of the economical transmission of gas, and the advantages which accrue from its distribution under high pressure. The advantages of a centralized manufacturing scheme for a big area over a number of small isolated gas-works, and of furnishing a supply of gas in bulk to the various undertakings already existing in the district, are pointed out; but it is urged that a supply in bulk can be given from a central area economically nowadays, when it has to be carried a long distance, only when it can be given under high pressure, and therefore the great advantage of a high-pressure distribution scheme is the practicability of furnishing to outlying gas undertakings at an economic price a supply of gas in bulk. In addition to this, in rural areas there may be a demand for gas—if not for lighting, then for power—which under ordinary conditions it would be impracticable to meet by reason of the capital expenditure involved in the laying of the necessary mains.

The accompanying map shows exactly what is proposed. The parts marked with continuous lines are the ordinary limits of gas supply; and the portion marked with broken lines is the area outside the limits of supply in which power is taken to lay mains for giving a supply in bulk to areas which lie beyond and are contiguous. Contiguous with, and interspersed through, these areas, are areas left white. Those are very largely areas where there are authorized companies or local authorities at present supplying gas.

The scheme is bound up with the fact that the question of Kent coal is now recognized to be rapidly hardening into a commercial proposition. In connection with collieries at the present moment well in course of development, the promoters propose to obtain a supply of coke-oven gas for distribution at high pressure, in detail or in bulk, throughout the area indicated in the Order. The Chislet Colliery Company, for example, who are now bringing to the surface over 4000 tons of coal a week—a large percentage of which is said to compare very favourably with that of Durham and Northumberland for coke-oven purposes—have decided to instal coke-oven plant in the immediate future; and their intention is to dispose of the surplus gas to the promoters of the Order. The idea is to put down, as soon as sufficient coal has been raised to keep them going, thirty coke-ovens, capable of dealing with about 900 tons a day. As a ton of Chislet small coking coal should produce 10,500 c.ft. of gas, with thirty ovens working there will be an approximate amount made of 10,000,000 c.ft. a day. A large proportion of the coal raised at the Chislet Colliery is transported to France, which it is thought may also prove to be a market for their metallurgical coke.

In addition to this, there is scheduled to the Order certain land in the parish of Nonington, in the rural district of Eastry, where the promoters will be in a position to manufacture themselves, should they so require, coke-oven gas for distribution in their area, though they will naturally prefer to obtain it from the colliery companies, who will have their coke-ovens absolutely at the pit's mouth, and therefore working under the most economical conditions practicable. The collieries are situated in various parts of the district; and there are a large number of individual gas undertakings all round, to whom it is felt by the promoters a cheap supply of coke-oven gas produced in the immediate vicinity should prove to be a great economic advantage. Besides this there are the various scattered communities in the area embraced in the Order for detailed supply which it is urged are never likely to obtain gas except under some such proposal as that put forward by the promoters. None of these by themselves would be able to start a gas undertaking.

The proposals of the Order are that a Company should be formed, with a capital of £120,000, with borrowing powers of one-half this amount—making a total of share and loan capital of £180,000. The promoters of the Order claim that it "is a very great and genuine attempt to apply the same principles of progress to the gas supply of



this country that have with so much success been applied in the United States of America."

At the Board of Trade inquiry technical evidence on behalf of the promoters was given first by Mr. Arthur Valon, who said that, unless a supply of coke-oven gas at high pressure was provided, he saw no other means by which the area referred to would be supplied with gas. The supply of gas in bulk to undertakings around would help, by spreading the overhead charges, to lower the price in the area of detail supplies. It was estimated that, by laying-down about 40 miles of main—what the promoters had undertaken as a sort of compulsory area—there would probably be a supply of from 42 to 43 million c.ft. of gas a year to individual consumers; the immediate capital expenditure being about £60,000. But, of course, what was looked forward to was the furnishing of bulk supplies in addition. The figure of capital outlay just mentioned would, in addition to the 43 million c.ft. for detail supplies, enable the promoters to send out a considerable quantity of gas in bulk to different undertakings. The maximum price stood in the Order at 2s. per therm, but this was a maximum, and had been fixed with a view to enabling them to deal effectively with special cases. With such a scattered area as this, it would be quite impossible to supply gas at the same figure over the whole of it. He was of opinion that this scheme of high-pressure gas distribution, for the particular area referred to, afforded a really good commercial proposition. What he felt about it as an engineer interested in gas was that it opened-up the prospect of supplying a type of district which had never been supplied, and which could not be supplied in any other way.

Mr. W. Doig Gibb, who also was a technical witness for the promoters, said the gas from the modern type of coke-oven was quite satisfactory—in fact, as good as was produced from gas-works. In his opinion, the area under discussion was very suitable for high-pressure distribution. Commercially speaking, it would be impossible to give a supply in any other way. Again, not only did they know that coal was produced in the area, but it was, in his opinion, coal essentially suitable for coke-ovens. It was a good coking coal, and made an excellent coke for foundry purposes. In addition, there was an attractive future here for coke-ovens, to his mind, owing to the fact that the coal was of such a friable nature. It did not bear well transport for any distance. With a battery of thirty ovens, and different charging times, coke-oven gas could be delivered consistently uniform in quality.

Objection was offered to proposals contained in the Order by the Canterbury Gas and Water Company and the Sandwich Corporation.

Harpenden District Gas Company.

At the ordinary general meeting of the Company—held at the gas-works, Harpenden, on the 9th inst.—the Chairman (Mr. T. H. Martin), in presenting the statement of accounts for the year ended June 30, pointed out that the Special Order under section 10 of the Gas Regulation Act had been passed by the Board of Trade, empowering the Company to raise additional capital, and for other purposes. He also stated that a second generator had been installed, which is proving a valuable addition to the existing Tully plant; and that £5000 additional capital stock had been raised during the year, which was all taken-up at a small premium. Referring to the accounts, the Chairman explained that the cost of coal, wages, and other items had been exceptionally high, and that residual products had considerably fallen; but even then the balance of profit was £166 more than the corresponding period. Dividends were declared at the rate of £8 10s. p.ct. per annum on the original and additional (8 p.ct. standard) capital stocks and £6 7s. p.ct. per annum on the additional capital stock (6 p.ct. standard)—less income-tax, and subject to the interim dividend already paid. Votes of thanks were passed to the Chairman and Directors, and also to the Engineer and Secretary (Mr. E. H. Martin) and the staff.

Portsea Island Gas Light Company.—The Directors will report to the shareholders at the meeting to-morrow (Thursday) that the profit and loss account for the half year ended June 30 shows an available balance of £39,232; and they recommend that dividends be declared for the six months at the rates per annum of 13 p.ct. on the "A" and "B" shares, 12 p.ct. on the "C" shares, 10 p.ct. on the "D" and "E" shares, and 5 p.ct. on the 5 p.ct. maximum stock—less income-tax. This will leave £20,549 to be carried forward. The demand for gas for domestic and industrial purposes has been well maintained, the number of consumers continues to increase, and a substantial additional number of cooking and heating appliances has been issued. Further reductions in the price of coal and in wages enabled the Directors to reduce the price of gas by 1·4d. per therm from the last December quarter, and by an additional 1d. per therm from the last March quarter; the total reduction being equal to approximately 10½d. per 1000 c.ft. The Directors recommend donations of £100 and £10 10s. to local hospitals, and also the distribution during the ensuing winter of 100 tons of coke among the poor resident within the limits of the Company's supply.

SULPHATE OF AMMONIA PRICES.

For September and October Delivery.

The British Sulphate of Ammonia Federation, Ltd., in a circular issued to fertilizer manufacturers, agricultural merchants, and co-operative societies, say they have booked orders for a very substantial quantity of sulphate of ammonia for July-August delivery. They now offer to sell for home agricultural use at the following price:

For September and October delivery.

£16 8s. per ton for neutral quality in fine friable condition, free from lumps, basis 25¾ p.ct. ammonia.

Delivered to consumer's nearest station or wharf in Great Britain, for prompt cash payment, in lots of 4 tons and upwards.

Limited quantities of ordinary quality will be available in some districts, and will be sold at 23s. per ton less than the above price, basis 25¼ p.ct. ammonia.

The Association draw attention to the fact that, owing to the coal strike in America, the world's supply of sulphate of ammonia will probably be curtailed to an even greater extent than was thought likely two months ago. When the price of

Nitrate of soda is £12, sulphate of ammonia is worth £16 5s. od. per ton
" " £12 10s., " " " " £16 18s. 6d. "
" " £13 " " " " £17 12s. od. "

FURTHER REDUCTION IN PRICE AT CROYDON.

A further reduction in the price of gas after September is intimated by the Croydon Gas Company. This has been decided upon in pursuance of the Directors' consistent policy of selling gas at the lowest price to their consumers. In eighteen months there has in this way been a gain to consumers of more than 10d. per 1000 c.ft. With reference to the "increased gas bill" agitation, it is pointed out that the period from April to June last year coincided with the coal strike, when patriotic citizens made efforts to cut-down to the lowest possible limits their consumption of all kinds of fuel, including gas. The effect of this was shown in the sales of gas—for the June quarter of 1921 as compared with 1920—which normally, and under comparable conditions, should, owing to the growth of the district, have exhibited an increase of about 5 p.ct., and which were actually less by 1 p.ct. For the corresponding quarter of this year, these abnormal circumstances were not present. The sales were 10 p.ct. higher than in 1920, and 11 p.ct. higher than in 1921. In other words, the two years showed the normal increase of 5 p.ct. a year. These figures are taken in volume of gas, as in 1920 this was the method of charge. In comparing gas bills for corresponding periods, there are also the possible variations in the weather to be taken into consideration. When the therm system was adopted by the Company, the quality decided upon was the same as had been made for several years past.

Cheaper Gas for Hartlepool.—The Hartlepool Gas and Water Company have decided to reduce the price of gas to ordinary consumers from 5s. to 4s. per 1000 c.ft. The rate of discount, which is 5 p.ct. to ordinary consumers, remains unaltered; and the discount for power purposes will be 12½ to 15 p.ct., according to quantity. On the subject of gas charges, the Company received a deputation from the Hartlepool Town Council a few weeks ago.

Asphyxiation by Gas Fumes.—While on a visit to her son at Warwick, Mrs. Lanman, aged 81, was found lying dead, having been asphyxiated by gas fumes. At the inquest, the Rev. F. H. Lanman said when his mother went to bed there was a low jet of gas burning in the room, and he turned it up for her. As she did not come down at the usual time next morning, he became suspicious, and on going into her room found her lying quite still, as though asleep. The room smelt strongly of gas, the tap being turned on. He thought the probable explanation was that she had gone to the tap last thing before getting into bed to make sure that it was off, and accidentally turned it on. The Jury returned a verdict of "Death by misadventure."

Satisfaction at Peterhead.—A reduction of 1s. per 1000 c.ft. as from the last reading of the meters has brought the price of gas at Peterhead down to 5s. 8d., to which figure it has been lowered in three stages from 7s. 6d. per 1000 c.ft. This steady reduction in price is proof of the good work that is being done by Mr. W. S. Easson (the Engineer and Manager) and the Gas Committee, at whose head is Bailie Dingwall. During the financial year to March 31 a slightly smaller quantity of gas was manufactured than in the preceding year, but the yield per ton of coal carbonized was a record for the works, at 11,339 c.ft. The cost of coal averaged £2 7s. 7d. per ton, against a pre-war rate of 15s. 9d. per ton. It is estimated that for the current year coal will cost £1 13s. 1d. per ton.

Shrewsbury Gas Light Company.—The Directors report that the net profit on the working for the year ended June 30 amounts to £12,082, and they recommend a dividend of 4¼ p.ct. (less tax) for the year, being the maximum authorized under the sliding-scale. This will leave a balance of £8049 in the profit and loss account, part of which will be required to replace withdrawals from the reserve fund. There has been an increase of 15 million c.ft. in the sale of gas during the year. An Order was made by the Board of Trade on Dec. 20 in accordance with the provisions of which the Company declared a calorific value of 450 B.Th.U., and have actually supplied an average value of 455 B.Th.U. during the six months to June 30. The costs of manufacture decreased during the year, and the price received for residuals also decreased, but the Directors reduced the price of gas as from the end of the March quarter by 1·8d. per therm, and have made a further reduction of 1d. per therm during the current quarter. The number of cookers on hire at June 30 was 4255, together with 1355 fires. There were 3520 ordinary and 4826 prepayment meters in use.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

Ashton-in-Makerfield Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. 8d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 18d. per therm. The following additional charges are also proposed for prepayment supplies: For a prepayment meter and fittings (including a cooking-stove), 3·6d. per therm; for a prepayment meter and fittings (not including a cooking-stove) 3d. per therm; and for a prepayment meter without fittings. 1·8d. per therm.

Pontypridd Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4·5d. per therm.

Borough of Stockton-on-Tees.

The maximum prices now authorized in respect of the supply of gas by the undertakers are 5s. per 1000 c.ft. within the borough and 6s. outside; and the prices they have asked the Board of Trade to substitute for these are 1s. 2d. and 1s. 4d. per therm.

DECLARATIONS OF CALORIFIC VALUE.

Emsworth Gas and Coke Company, Ltd.—475 B.Th.U. (Sept. 28.)
Leicester Corporation.—450 B.Th.U. (Oct. 1.)

SPECIAL ORDER.

Ryde Gas Light Company.

An application is to be made by the Company to the Board of Trade for a Special Order under section 10 to enable them to amalgamate the undertaking of the Brading Gas Company, to acquire scheduled land for gas-works purposes, to issue preference capital, and for other purposes.

GAS REGULATION ACT ORDERS.

There have been received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Bexhill Water and Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 19·2d. per therm.

Prepayment meter clauses are included. (Aug. 8.)

Draycott Gas Company.

After the declared date, the standard prices in respect of gas supplied by the undertakers shall be 14·6d. and 15·6d. per therm; and these prices respectively shall be substituted for the prices of 4s. 6d. and 5s. per 1000 c.ft. mentioned in sub-section (2) of section 27 (repeal of section 38 of Act of 1888 and dividends dependent on price charged) of the Draycott Gas Act, 1908.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-four-fifths. (Aug. 11.)

Long Eaton Gas Company.

After the declared date, the prices of 15·8d. and 17·8d. per therm respectively shall be substituted for the prices of 5s. 2d. and 6s. 2d. per 1000 c.ft. wherever they occur in sub-section (1) of section 63 (dividend dependent on price charged) of the Long Eaton Gas Act, 1901; "13 4d." shall be substituted for "4s." and "15·4d." for "5s." in the third proviso to that sub-section.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five-and-one-tenth.

After the declared date, the word "therm" shall be substituted for "1000 c.ft." wherever they occur in sub-section (2) of section 63 of the Long Eaton Gas Act, 1901. (Aug. 11.)

South Elmsall, South Kirkby, and North Elmsall Gas-Works.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15·4d. per therm, and this price shall be substituted for the price of 4s. 6d. per 1000 c.ft. wherever it occurs in section 22 (price of gas) and in section 23 (price of gas supplied to the Rural District Council of Hemsworth) of the South Elmsall, South Kirkby, and North Elmsall Gas Order, 1900.

After the declared date, the word "therm" shall be substituted for "1000 c.ft.," and the words "fifth of a penny" shall be substituted for the word "penny" wherever they occur in paragraph (2) of Schedule B to the South Elmsall, South Kirkby, and North Elmsall Gas Order, 1900. (Aug. 8.)

Tadcaster and Wetherby District Gas Light Company, Ltd.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 16·8d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five-and-one-fifth. (Aug. 11.)

Uttoxeter Gas-Works, Ltd.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 13·2d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (Aug. 4.)

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 14.

As is usual at this time of the year, there is not much actual business to record. There are numerous inquiries for pitch for export, and it is understood that some makers are reluctant to quote owing to the firmness of the market. The price may be put at 80s. to 82s. 6d. net per ton nominally. Creosote is also in a strong position, and the value is about 6¾d. net in bulk at makers' works for quantities. Benzole, toluole, and solvent naphtha are also improving; there being an advance of about one penny per gallon.

Tar Products in the Provinces.

Aug. 14.

The market for pitch is still very firm indeed, and there is plenty of inquiry, especially for delivery to the end of the year; but at present buyers appear to be disinclined to pay the last advance. Creosote oil is firm for immediate delivery, and there is further inquiry from America, who are believed to be in need of some quantity still for delivery to the end of the year. Carbolic acid is rather easier. It would seem that the last of the great alteration in exchange in Germany recently has made it difficult for that country to continue purchasing at ruling figures. Cresylic acid is still very firm, with plenty of inquiry for delivery to the end of the year, especially for the better grades. Naphthalene is neglected. Benzole is dull. Solvent naphtha is slightly firmer. Heavy naphtha is a neglected market.

The average values for gas-works products during last week were: Gas-works coal tar, 45s. to 50s. Pitch, East Coast, 78s. to 80s. f.o.b. West Coast—Manchester, 75s. to 76s.; Liverpool, 76s. to 77s.; Clyde, 77s. to 78s. Benzole 90 p.ct. North, 2s. to 2s. 1d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 2s. to 2s. 1d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6d. to 6¼d.; salty, 5¼d. to 5⅜d. Scotland, 4⅜d. to 5d. Heavy oils, in bulk, North, 6¼d. to 6⅜d. Carbolic acid, 60 p.ct., 2s. to 2s. 1d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

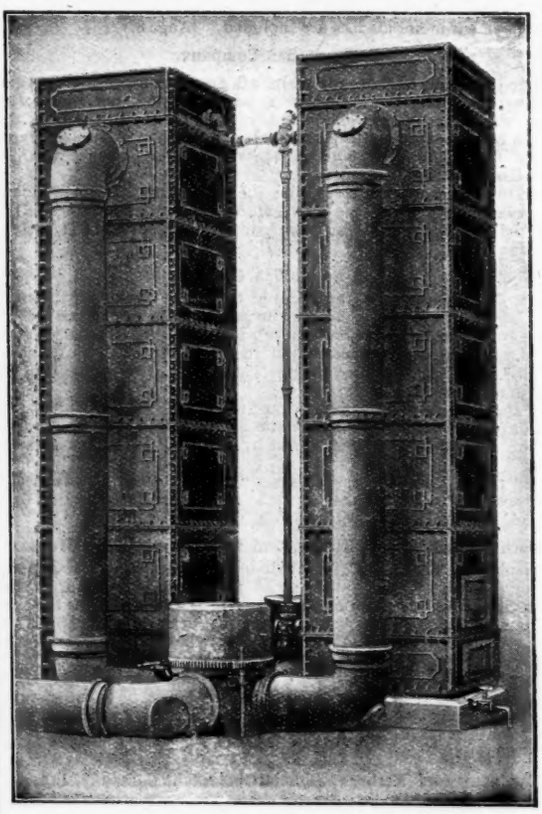
FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

This market is steady, and up to the time of writing trade has not been much developed. Pitch remains firm, although there is no improvement in prices since our last report. In South Wales, consumers are paying 90s. to 95s. per ton, and in one or two directions we hear of higher prices, which, however, may have been paid by those who sold "short" some time ago and are now being forced to deliver. Creosote is firm in view of possible better business with America, on account of the coal strike there. Cresylic acid is fairly steady without much fresh business. The latest values are 2s. 3d. to 2s. 4d. per gallon for pale 97-99, and 2s. to 2s. 1d. for dark 95-97. The market for naphthalenes is poor, and refined is still quoted at £17 per ton, with common qualities of crude at £4 to £5 per ton. Carbolic acid is quiet, but rather on the strong side. Makers are producing little crude, as they maintain current prices, which are 1s. 10d. to 2s., do not pay them to do so. The latter price is about the most that can be made by manufacturers of crystal carbolic, which is worth in the neighbourhood of 6d. per lb. The demand for solvent naphtha is rather better; but even now it is not very great, and values remain 1s. 9d. to 2s. per gallon. Intermediate products have been more interesting since our last report; the export market being particularly better. No great price changes are to be noted. Aniline oil and salts have been wanted for export at 1s. 1d. and 1s. 2d. per lb. respectively. Resorcin is 6s. per lb. for technical grade. Beta naphthol is steady, with fairly large supplies available at 1s. 4d. per lb. Salicylic acid, technical grade, is quoted at 1s. per lb.

Sulphate of Ammonia.

The British Sulphate of Ammonia Federation have now fixed prices for home agricultural use for September and October deliveries at £16 8s. per ton for neutral quality 25¾ p.ct. ammonia, and £15 5s. for ordinary 25¼ p.ct. material. The Association calls attention to the interesting fact that when the price of nitrate of soda is £12, £12 10s., and £13—sulphate of ammonia is worth £16 5s., £16 18s. 6d., and £17 12s. per ton respectively. It is also to be pointed out that there is likely to be a world shortage of sulphate of ammonia in the coming season. From America it is reported that many coke-ovens have been closed-down, and until some settlement is arrived at there the outlook is most uncertain. Production is below requirements, and as home needs are being taken care of first, it would appear that foreign consumers of non-producing countries will this year experience considerable shortage. Consequently, many careful observers of the situation anticipate that nitrate of soda will this year have an excellent opportunity of making good the shortage that will be experienced in sulphate of ammonia.



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STOCK MARKET REPORT.

THE Stock Exchange has had another quiet week, devoid of any salient feature, which may be fairly attributed in part to the fact that we were effectively launched into the vacation, and in part to the general apprehension engendered by the state of political affairs both at Home and abroad. It was in a measure consolatory to find that markets as a rule did not exhibit pronounced weakness such as might have been anticipated. In the gilt-edged division, Home Government issues on the whole came out fairly well. Of the big four, Consols alone were fractionally lower. Friday's figures were: Consols 58½-59, War Loan 100⅝-100⅞, Funding 89½-89⅝, Victory 90⅝ 91¼. Colonials were steady; but Indian were rather lower. Home Rails were well supported at first, but receded before the close. Canadians had a smart rise. The Foreign Market was rather shaky, and falls predominated; but French recovered. Business in the Gas Market put together a fair aggregate of transactions for a four-day week; but a good many issues were overlooked altogether. The tendency on balance was favourable, advances in quotation outnumbering and outweighing the reductions. In the London Companies, Gas Light and Commercial were firm and unchanged, but South Metropolitan fell 1. In Suburban and Provincial, three Bournemouths rose ⅛ each, Brighton and Hove original rose 3, ditto "A" 2, Hornsey 15, and Maidstone 2. Ilfords, being in course of conversion, are out of quotation. In the Continentals, Imperial fell 3, and European 1.

The following transactions in gas during the week were recorded: On Tuesday, British 31⅛, European 12, 12⅛, Gas Light ordinary 93, 93¼, 93⅛, 93⅜, 93⅝, 94, 94¼, 94⅜, ditto preference 77⅜, 78⅛, ditto debenture 63, Imperial Continental 150, 150¼, 753, 154⅛, Primitiva 14s. 6d., ditto preference 40s. 6d., ditto 1911 debenture 56⅛, South Metropolitan 95⅛, 96⅛, Tottenham 4 p.ct. debenture 77⅛, ditto 5 p.ct. preference 90, Swansea 7 p.ct. preference 104, ditto 6⅛ p.ct. debenture 104⅜. On Wednesday, Commercial 3⅛ p.ct. 93, European 11⅜, Gas Light ordinary 93¼, 93⅛, 93⅜, 93⅝, 94⅛, ditto maximum 62⅜, 63, ditto preference 77⅛, 78¼, ditto 10 p.ct. bonds 182⅛, Primitiva preference 40s., ditto 4 p.ct. debenture 74, San Paulo preference 6¼, South Metropolitan 95⅛, 95⅜, Croydon 7 p.ct. debenture 106, 106⅛, Hornsey 4 p.ct. debenture 78, Liverpool 7 p.ct. preference 107⅜. On Thursday, Bombay 4⅞, Brighton and Hove original 170, British 31⅛, European 11, 12, 12⅛, Gas Light ordinary 93, 93⅛, 93⅜, 93⅝, 94, 94⅛, ditto preference 78⅛, ditto debenture 62½, Imperial Continental debenture 73, Oriental 95, Primitiva 15s., ditto preference 40s. 9d., River Plate debenture 56⅞, South Metropolitan 95, 95⅛, 95⅜, 96, ditto 6⅛ p.ct. debenture 107, Tottenham 4 p.ct. debenture 76⅛, Liverpool 7 p.ct. preference 106⅜, Southgate and District 7 p.ct. maximum 104⅛, 105. On Friday, Bristol 90⅜, Commercial 4 p.ct. 95, ditto 3⅛ p.ct. 93⅛, Gas Light ordinary 93⅛, 93⅜, 94, 94⅛, ditto maximum 62⅛, 62⅜, ditto preference 78⅛, 78⅜, 79, 79⅛, 79⅜, 79⅝, ditto debenture 63⅛, 63⅜, Hornsey 130, Imperial Continental 150, ditto debenture 72, Liverpool 93⅜, Monte Video 64⅛, Oriental 95⅛, 96, Primitiva preference 40s., 40s. 6d., South Metropolitan 95, 95⅛, 96, ditto 6⅛ p.ct. debenture 106⅛, 107, Danish 5 p.ct. preference 55s.

In the Money Market, the position was very similar to that of the preceding week; prices opening very firm, and a well-sustained demand continuing through the week. Discount rates were slower to move, but they wound up decidedly harder. The silver market was quiet, and the price dropped ⅛ to 34⅜d. The Bank of England rate was 3 p.ct., as fixed on the 13th ult.

ANTE-WAR PRICES AND DIVIDENDS. LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Mch. 15	4	4%	Aldershot 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Apl. 12	2½	3⅛%	Alliance & Dublin Ord.	59—64	60—65	...
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	May 18	7½	4/-	Bombay, Ltd.	5⅞—6⅛	4⅛—5	4⅛
100,000	5	Aug. 10	16	7½%	Bournemouth Gas and Water { 5 p.c.	..	11—12*	...
383,110	10	,,	7	7%	Bournemouth Gas and Water { B 7 p.c.	15—15⅛	10⅛—11*	...
115,000	10	,,	6	6%	Bournemouth Gas and Water { Pref. 6 p.c.	13⅛—14	8—9*	...
162,065	—	June 29	—	4%	Bournemouth Gas and Water { 4 p.c. Deb.	..	63—68	...
992,045	Stk.	July 27	14	6t/-	Brentford A Consolid.	261—266	92—97	...
734,920	,,	,,	11	6t/3	Do. B New	204—209	92—97	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Mch. 15	11	11%	Brighton & Hove Orig.	208—213	168—173	170
244,200	,,	,,	8	8⅛%	Do. A Ord. Stk.	154—159	120—125	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	90½
530,000	20	Mch. 15	12½	10%	British	44—45	30—32	31½
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	76—80	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1⅛—2⅛	6⅛—7⅛	...
100,000	10	Apl. 27	—	4⅛%	Do. 4½ p.c. Pref.	4—6	6—6½	...
100,000	Stk.	June 29	4½	4⅛%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	92—97	95
560,000	,,	,,	5⅛	55/-	Do. 3½ p.c. do.	103—105	92—97	93—93⅛
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71⅛	55—60	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	37—42	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	200—210	.
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	160—170	...
492,270	Stk.	—	6	4⅛%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17⅛—18	11—12	11—12⅛
16,298,975	Stk.	July 27	4/17/4	52/-	Gas Light and Coke { 4 p.c. Ord.	98—102	93—96	93—94⅛
2,600,000	,,	,,	3⅛	35/-	Gas Light and Coke { 3⅛ p.c. max.	76—79	61—64	62⅛—63
4,062,235	,,	,,	4	4%	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	76—80	77⅛—79½
4,674,850	,,	June 15	3	3%	Gas Light and Coke { 3 p.c. Con. Deb.	72⅛—74⅛	62—65	62⅜—63
130,000	,,	Dec. 11	10	10%	Gas Light and Coke { 10 p.c. Bonds	..	..	182⅛
82,500	,,	Sept. 14	5	3⅛%	Hastings & St. L. 5 p.c.	..	78—81	...
258,740	,,	Mch. 15	3⅛	2⅛%	Do. 3⅛ p.c.	87—89	60—63	...
70,000	10	May 18	11	5%	Hongkong & China, Ltd.	16⅛—16⅛	6—7	...
86,600	Stk.	Mch. 15	9	9⅛%	Imperial Continental	..	130—135	130
131,000	,,	Aug. 10	7⅛	7⅛%	Ilford A and C	151—154	..	...
65,780	,,	,,	6⅛	5⅛%	Do. B.	115—118	..	
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	..	...
1,976,000	,,	May 18	9	5%	Imperial Continental	150—160	150—155	150—154⅛
404,800	,,	Aug. 10	3⅛	3⅛%	Do. 3⅛ p.c. Deb. Red.	84—86	72—77*	72—73
235,242	,,	July 27	6⅛	6⅛%	Lea Bridge Ord. 5 p.c.	119—121	93—98	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A.	211—213	..	93⅛
					Liverpool 5 p.c. Ord. { B.	146—148	..	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92*	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean	4⅛—4⅜	3⅛—3⅜	..
250,000	100	Apl. 3	4⅛	4⅛%	Met. of Melbourne { 4⅛ p.c. Deb.	99—101	97—98	...
541,920	Stk.	June 1	4	4%	Monte Video, Ltd.	11⅛—12	63—68	64⅛
1,875,892	,,	July 27	4⅛	4⅛%	Newcastle & Gatsh'dCon.	98⅛—99⅛	82—83	...
529,705	,,	June 29	3⅛	3⅛%	Do. 3⅛ p.c. Deb.	82—83	66—70	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	12⅛—13	...
55,940	10	Mch. 15	7/14/0	10/18	,, ,, 7 p.c.	14—15	10⅛—11⅛	...
300,000	Stk.	May 18	8	8%	Oriental, Ltd.	117—122	92—97	95—96
60,000	5	—	10	—	Ottoman, Ltd.	7⅛—7⅛	2—3	...
188,120	Stk.	June 29	—	6/3/0%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Mch. 15	13	62/6	Portsea Island, B	128—131	100—105	...
100,000	50	,,	12	57/6	Do. C	118—121	85—90	...
249,980	5	—	8	—	Primitiva Ord.	5⅛—6	⅛—⅜	14/6—15/-
499,960	5	—	5	—	Do. 5 p.c. Pref.	4⅛—5	2—2⅛	40/—40/9
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	74—76	74
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	56⅛
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	56⅜
150,000	10	Mch. 30	6	6/-	San Paulo { 6 p.c. Pref.	10⅛—11	5⅞—6⅛	6⅛
125,000	50	July 3	5	5%	San Paulo { 5 p.c. Deb.	47—49	35—38	...
135,000	Stk.	Mch. 15	10	5%	Sheffield A	223—224	94⅛—96⅛	...
209,984	,,	,,	10	5%	Do. B	222—224	94⅛—96⅛	...
523,500	,,	,,	10	5%	Do. C	220—222	94⅛—96⅛	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	June 29	9	7½%	South African	10⅛—11⅛	7—9	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	94—96	95—96⅛
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	94—96	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72⅛—74⅛	61—64	62⅛
224,820	,,	Feb. 23	8⅛	8⅛%	South Shields Con. Stk.	157—159	109—111	...
1,087,795	,,	,,	6	5⅝%	S'th Suburb'n Ord. 5 p.c.	114—116	98—103	...
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	93—98	...
647,740	,,	May 18	5	5%	Southampton Ord.	99—102	70—75	...
121,275	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	63—68	...
120,000	,,	July 27	—	7⅛%	Tottenham { A 5 p.c.	135—138	110—115	...
782,275	,,	,,	6	6%	Tottenham District { B 3½ p.c.	115—117	97—102	...
181,253	,,	June 15	4	4%	Tottenham District { 4 p.c. Deb.	87—89	75—80	76⅛—77⅛
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Mch. 15	5	3⅛%	Tynemouth 5 p.c. max.	108⅛—109	74—76	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 27	8⅛	72/6	Wandsworth A 5 p.c.	151—156	111—115	...
255,636	,,	,,	6⅛	57/6	Do. B 3½ p.c.	129—134	95—100	...
1.8,075	,,	,,	—	50/9	Do. C.	..	85—90	...
140,865	,,	,,	—	50/9	New Ordinary	..	85—90	...
352,000	,,	,,	6⅛	53/9	Wimbledon 5 p.c.	117—122	92—97	...
98,000	,,	,,	6⅛	58/9	Epsom 5 p.c.	121—126	95—100	...
88,416	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

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